CHAPTER 5 – CUMULATIVE EFFECTS

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5.0. CUMULATIVE EFFECTS

5.1. Introduction/Approach

Cumulative effects are those effects on the environment which result from the incremental effect of a Federal action when added to other past, present, and reasonably foreseeable actions in the cumulative effects study areas (CESAs), regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor, but collectively significant actions, taken over a period of time. There are obviously innumerable actions which would contribute to the effects from the MMPO and land disposal alternatives. Therefore, this cumulative effects analysis necessarily focuses on only the most important effects from other actions. The major past and present land uses and surface disturbance within the CESAs include roads, utility corridors, wildfire[1], livestock grazing, agriculture, mining, recreation, residential development, timber harvest, and changes in land jurisdiction. The following cumulative effects analysis is only for effects of greater than negligible magnitude from the MMPO or land disposal alternatives.

For each resource the extent to which the effect from the project could reasonably be detected was considered, and then a logical geographic area was defined as the CESA; large enough to capture the effects from other meaningful actions, but small enough to prevent excessive dilution of the cumulative effects. For simplicity, when reasonable and conservative, a single CESA was used for multiple resources that would otherwise have had slightly different CESAs. This approach to defining CESAs is based on guidance from the CEQ (1997, 2005). The CESA for each resource – and the rationale for the boundary of each CESA – is described in their respective sections.

For the land disposal alternatives, the negligible effects to most of the resources for the Garden Creek property precluded its inclusion in the cumulative effects analysis for all of the resources except minerals (Section 5.2.) and tribal treaty rights and interests (Section 5.14.).

5.1.1. Context

The CESAs include many different jurisdictions which are detailed by each CESA in Table 5.1-1. The table indicates how many total acres are within the CESA and breaks it down by ownership and the percentage it represents within the CESA. The cumulative effects analysis compares the (direct and indirect) effects of the MMPO and land disposal alternatives to the existing land uses and actions in each CESA (Table 5.1-2., Appendix 5A) and the land uses and actions that would occur from reasonably foreseeable actions (Table 5.1-3., Appendix 5A). Appendix 5A provides a list and brief descriptions of many past, present, and reasonably foreseeable projects that contribute to cumulative effects. Some of these projects are specifically discussed under the resource discussions that follow.

Table 5.1-2. details the existing quantifiable land uses within the CESAs that will be discussed by resource topic in the proceeding sections. As noted previously, some resources share the same CESA boundary and therefore are grouped in the table.

[1] typically evaluated as a cumulative effect even though many are natural

Table 5.1-3. details the future quantifiable land uses within each CESA that will be discussed by resource topic in the proceeding sections and that are detailed in Appendix 5A. Resources are presented in this table by CESA footprint.

5.1.2. Past, Present, and Reasonably Foreseeable Actions

Past, present, and reasonably foreseeable actions that have impacted the CESAs to varying degrees include roads and utility corridors, wildfire, livestock grazing, agriculture, mining, recreation, residential development, timber harvest/vegetation management, and changes in land jurisdiction. Although these actions probably do not account for all of the impacts that have or are likely to occur in the CESAs, GIS analysis, agency records, and professional judgment suggest that they have contributed to the majority of cumulative impacts that have occurred in the CESAs.

These actions are summarized below and quantified to the extent possible in the subsequent tables (Table 5.1-2., Table 5.1-3). Where specific data was not available (such as fugitive dust emissions or acres of agricultural land within a CESA), comparable data (such as acres of disturbance or percentage of private lands) was used as the metric.

5.1.2.1. Roads and utility corridors

There is an extensive network of roads and utility corridors (power lines, pipelines, telephone lines, fiber optic cables, etc.) in the CESAs. Widths were assigned to each type of road and utility corridor to calculate the past, present, and future disturbance from such features (Table 5.1-2). Roads would be constructed in the future, as would utility corridors, both most likely a result of rural residential development. Roads and utility corridor footprints were estimated using the following: 100 foot ROW for interstate and primary roads, 50 foot ROW for State highways and utility corridors, 25 foot ROW for city, local, and rural roads; and 12 foot ROW for four-wheel drive (4WD) and other undeveloped roads (Table 5.1-2). Acreages associated with roads and utility corridors are presented by CESA in Table 5.1-2.

5.1.2.2. Wildfire

The CESAs (except the Garden Creek property) are in the BLM's East Fork fire management unit (FMU) (BLM 2005d) and the SCNF FMUs 2 and 3 (SCNF 2012). The East Fork FMU is ranked as moderate priority for fire suppression partially due to the concern of the spread of noxious and invasive species. The dominant causes of wildfire in the FMU are humans and lightning. Wildfire typically occurs in the East Fork FMU from mid-July through August and, with much lower frequency, during the fall hunting season (human-caused fires). Between 1983 and 2004 only 858 total acres in the East Fork FMU burned and 64 percent of those fires were less than 0.2 acres in size. Fire spread is limited by topography and lack of vegetative continuity (rock, bare soil, and talus slopes) (BLM 2005d). Although equivalent statistics and data were not provided in the SCNF Fire Management Plan (SCNF 2012), the SCNF FMUs 2 and 3 are likely comparable to the East Fork FMU as these areas are adjacent and include similar topography and vegetative cover. The pattern of wildfires would continue in the foreseeable future. The trend for wildfire in Idaho, and the western US in general, appears to be toward larger, longer lasting, more intense fires. Although the lands in the East Fork FMU may not historically have seen large fires, this overall trend may apply in the CESA as well.

Table 5.1-1. Land jurisdiction by CESA.

CESA		BLM Challis FO	BLM Pocatello FO	SCNF	BOR	Bureau of Indian Affairs	Private	State of Idaho	Total
Geologic and soil resources CESA	acres	14,125	0	106,334	0	0	6,103	440	127,002
	% of CESA	11.1	-	83.7	-	-	4.8	0.4	100.0
Minerals and air Quality CESA	acres	803,558	0	2,121,665	0	0	182,210	54,036	3,161,469
	% of CESA	25.4	-	67.1	-	-	5.8	1.7	100.0
Vegetation, forest resources, and invasive, non-native species, wetlands, floodplains, and riparian areas CESA	acres	74,698	0	119,767	0	0	14,697	4,353	213,514
	% of CESA	35.0	-	56.1	-	-	6.8	2.0	100.0
Range resources CESA	acres	37,043	-	56,285	0	0	0	1,395	94,722
	% of CESA	39.1	-	59.4	-	-	-	1.5	100.0
Wildlife resources and transportation CESA	acres	261,419	-	350,905	0	0	34,014	16,059	662,397
	% of CESA	39.5	-	53.0	-	-	5.1	2.4	100.0
Fish and aquatic, water resources CESA	acres	75,400	-	119,767	0	0	14,986	4,353	214,506
	% of CESA	35.2	-	55.8	-	-	7.0	2.0	100.0
TES fish species CESA	acres	793,675	0	797,373	0	0	149,941	51,271	1,792,261
	% of CESA	44.3	-	44.5	-	-	8.4	2.9	100.0

CESA		BLM Challis FO	BLM Pocatello FO	SCNF	BOR	Bureau of Indian Affairs	Private	State of Idaho	Total
Noise CESA	acres	9,860	0	18,898	0	0	4,547	348	33,653
	% of CESA	29.3	-	56.2	-	-	13.5	1.0	100.0
Visual resources CESA	acres	38,392	0	194,715	0	0	8,426	1,751	243,284
	% of CESA	15.8	-	80.0	-	-	3.5	0.7	100.0
Land use and recreation CESA	acres	803,558	-	2,121,665	0	0	182,210	54,036	3,161,469
	% of CESA	25.4	-	67.1	-	-	5.8	1.7	100.0
Socioeconomic factors and cultural resources CESA	acres	1,380,222	0	4,187,901	0	0	427,320	91,722	6,087,165
	% of CESA	22.7	-	68.8	-	-	7.0	1.5	100.0
Tribal treaty rights and interests CESA	acres	1,380,222	75,646	4,307,135	17	115,533	806,078	139,625	6,824,256
	% of CESA	20.2	1.1	63.1	<0.1	1.7	11.8	2.0	100.0

Table 5.1-2. Quantifiable surface disturbance from past and present actions by CESA.

CESA		Roads Interst. and Prim.[1]	Roads Second. and State[2]	Roads Local, Rural, City[3]	Roads Other, 4WD[4]	Utilities[2]	Wildfire*	Grazing*	Mining (Active and Past)	Total (Not Incl.)*
Geologic and soil resources CESA (127,002 acres)	area or number	0	13.2 mi.; 80 acres	20.3 mi.; 61.5 acres	132.3 mi.; 192.4 acres	50 mi.; 303 acres	1,193.4	85,647.8	6 active 83 past 2,950 acres[5]	3,459.5
	% of CESA	-	< 0.1	< 0.1	0.2	0.2	0.9	67.4	2.3	2.7
Minerals and air quality CESA (3,161,469 acres)	area or number	83.8 miles; 1,015.8 acres	98.3 miles; 595.8 acres	747.2 miles; 2,264.2 acres	NC	801.3 mi.; 4,856.4 acres	304,964.5	2,295,887.9	100 active 980 past 5,400 acres[5]	11,554.8
	% of CESA	< 0.1	< 0.1	< 0.1	-	0.2	9.7	72.6	0.2	0.4
Vegetation, forest resources, and invasive, non-native species wetlands, floodplains, and riparian areas CESA (213,514 acres)	area or number	3.4 mi.; 41.2 acres	30.4; 184.2 acres	55.2 mi.; 167.3 acres	300.3 mi.; 436.8 acres	170.1 mi.; 1,031 acres	2,717.5	152,202.5	6 active 36 past 2,822.6 acres[5]	4,683.1
	% of CESA	< 0.1	< 0.1	< 0.1	0.2	0.5	1.3	71.3	2.2	3.7

CESA		Roads Interst. and Prim.[1]	Roads Second. and State[2]	Roads Local, Rural, City[3]	Roads Other, 4WD[4]	Utilities[2]	Wildfire*	Grazing*	Mining (Active and Past)	Total (Not Incl.)*
Range resources CESA (94,722 acres)	area or number	0	0	3.2 mi.; 9.7 acres	208.2 mi.; 302.8 acres	53.3 mi.; 323.0 acres	4,462.8	92,242	4 active 18 past 2,825.6 acres[5]	3,458.1
	% of CESA	-	-	< 0.1	0.3	0.3	4.7	97.4	3.0	3.7
Wildlife resources and trans-portation CESA (662,397 acres)	area or number	22.8 miles; 276.4 acres	47.1 miles; 285.5 acres	166.5 miles; 504.5 acres	NC	405 miles; 2,454.5 acres	30,760.4	486,614.5	15 active 95 past 2,822.6 acres[5]	6,343.5
	% of CESA	< 0.1	< 0.1	< 0.1	-	0.4	4.6	73.5	0.4	1.0
Fish and aquatic, water resources CESA (214,506 acres)	area or number	3.4 miles; 41.2 acres	37.5 miles; 227.3 acres	54.3 miles; 164.5 acres	287.9 miles; 418.8 acres	182.7 miles; 1,107.3 acres	2,717.5	152,780.2	6 active 37 past 2,822.6 acres[5]	4,781.7
	% of CESA	< 0.1	0.1	< 0.1	0.2	0.5	1.3	71.2	1.3	2.2
TES fish species CESA (1,792,261 acres)	area or number	86.3 miles; 1,046.1 acres	28.6 miles; 173.3 acres	555.9 miles; 1,684.5 acres	NC	695.2 miles; 4,189.4 acres	68,149.3	1,463,378.9	20 active 103 past 2,822.6 acres[5]	9,915.9
	% of CESA	< 0.1	< 0.1	< 0.1	-	0.2	3.8	81.6	0.2	0.6

CESA		Roads Interst. and Prim.[1]	Roads Second. and State[2]	Roads Local, Rural, City[3]	Roads Other, 4WD[4]	Utilities[2]	Wildfire*	Grazing*	Mining (Active and Past)	Total (Not Incl.)*
Noise CESA (33,653 acres)	area or number	0	3.1 miles; 18.8 acres	8.9 miles; 27.0 acres	39 miles; 56.7 acres	24.5 miles; 148.5 acres	326.4	21,983.1	4 active 8 past 2,822.6 acres[5]	3,073.6
	% of CESA	-	< 0.1	< 0.1	0.2	0.5	1.0	65.3	8.4	9.1
Visual resources CESA (243,284 acres)	area or number	0	23.3 miles; 141.2 acres	44.6 miles; 135.2 acres	297.5 miles; 432.7 acres	125.1 miles; 758.2 acres	11,936.5	169,876.6	9 active 52 past 2,822.6 acres[5]	4,289.9
	% of CESA	-	< 0.1	< 0.1	0.2	0.3	4.9	69.8	1.2	1.8
Land use and recreation CESA (3,161,469 acres)	area or number	83.8 miles; 1,015.8 acres	98.3 miles; 595.8 acres	747.2 miles; 2,264.2 acres	NC	614.3 miles; 3,723.0 acres	304,964.5	2,295,887.9	41 active 205 past 2,822.6 acres[5]	10,421.4
	% of CESA	< 0.1	< 0.1	< 0.1	-	0.1	9.6	72.6	< 0.1	0.3
Socioecon. factors and cultural resources CESA (6,087,165 acres)	area or number	170.5 miles; 2,066.7 acres	195.5 miles; 1,184.8 acres	1041.9 miles; 3,157.3 acres	NC	926.2 miles; 5,613.3 acres	1,057,556.9	4,016,569.9	79 active 501 past 2,822.6 acres[5]	14,844.7
	% of CESA	< 0.1	< 0.1	< 0.1	-	0.1	17.4	66.0	< 0.1	0.2

CESA		Roads Interst. and Prim.[1]	Roads Second. and State[2]	Roads Local, Rural, City[3]	Roads Other, 4WD[4]	Utilities[2]	Wildfire*	Grazing*	Mining (Active and Past)	Total (Not Incl.)*
Tribal treaty rights and interests CESA (6,824,256 acres)	area or number	373.5 miles; 4,527.3 acres	198.2 miles; 1,201.2 acres	1,305.6 miles; 3,956.4 acres	NC	1,358.6 miles; 8,239.4 acres	1,081,322.4	4,243,959.7	90 active 564 past 2,822.6 acres[5]	31,858.4
	% of CESA	< 0.1	< 0.1	< 0.1	-	0.1	15.8	62.2	< 0.1	0.5

* To group all types of disturbance together would not provide an accurate picture of the CESA, much of which, though grazed or burned, is relatively undisturbed. The inclusion of burned, grazed, or habitat improvement areas in this table conservatively acknowledges that some level of modification to the natural state has occurred. Areas are not necessarily exclusive and may overlap.

NC = Not calculated due to size of the CESA.

[1] Estimated 100 foot ROW; [2] Estimated 50 foot ROW; [3] Estimated 25 foot ROW; [4] Estimated 12 foot ROW

[5] Custer County = the area of the TCM (2,822.6 acres), the Three Rivers Stone quarry (182 acres, BLM 2008), ~ 350 rock pits (~ 4 acres each, but only ~ 100 active), and 980 prospects and mines (a few involve 10s acres, many had negligible surface disturbance, most have been naturally revegetated, as an order-of-magnitude approximation each is assumed to have 1 acre of current surface disturbance); CESA for Geology and Physiography = the area of the TCM, 5 rock pits (45.1 acres), and 83 prospects and mines (~ 1 acre each)

Table 5.1-3. Quantifiable reasonably foreseeable actions by CESA.

CESA		Land Jurisdiction	Timber Harvest/ Vegetation Management	Utilities	Mining
Geologic and soil resources CESA (127,002 acres)	acres	~2,850	3,200	3	3
	% of CESA	2.2	2.5	< 0.1	< 0.1
Minerals and air quality CESA (3,161,469 acres)	acres	~2,850	3,200	3	3
	% of CESA	< 0.1	0.1	< 0.1	< 0.1
Vegetation, forest resources, and invasive, non-native species, wetlands, floodplains, and riparian areas CESA (213,514 acres)	acres	~2,850	0	0	3
	% of CESA	1.3	0.0	0.0	< 0.1
Range resources CESA (94,722 acres)	acres	622	0	0	0
	% of CESA	0.7	0.0	0.0	0.0
Wildlife resources and transportation CESA (662,397 acres)	acres	~2,850	0	0	3
	% of CESA	0.2	0.0	0.0	< 0.1
Fish and aquatic, water resources CESA (214,506 acres)	acres	~2,850	0	0	3
	% of CESA	1.3	0.0	0.0	< 0.1
TES fish species CESA (1,792,261 acres)	acres	~2,850	3,200	0	3
	% of CESA	0.2	0.2	0.0	< 0.1

CESA		Land Jurisdiction	Timber Harvest/ Vegetation Management	Utilities	Mining
Noise CESA (33,653 acres)	acres	~2,850	0	0	3
	% of CESA	8.4	0.0	0.0	< 0.1
Visual resources CESA (243,284 acres)	acres	~2,850	0	0	3
	% of CESA	1.2	0.0	0.0	< 0.1
Land Use and recreation CESA (3,161,469 acres)	acres	~2,850	3,200	3	3
	% of CESA	< 0.1	0.1	< 0.1	< 0.1
Socioeconomic factors and cultural resources CESA (6,087,165 acres)	acres	~2,850	3,200	3	3
	% of CESA	< 0.1	< 0.1	< 0.1	< 0.1
Tribal treaty rights and interests CESA (6,824,256 acres)	acres	~2,850	3,200	3	3
	% of CESA	< 0.1	< 0.1	< 0.1	< 0.1

Prescribed burning is used to achieve several objectives such as reduce wildfire hazards, improve rangeland and forest health, and create defensible space which ultimately aids in wildland fire suppression activities. Prescribed burning can provide numerous benefits, including forage and habitat for wildlife, watershed protection, and landscape diversity. Acreages associated with wildfire and prescribed burning are presented by CESA in Table 5.1-2.

5.1.2.3. Livestock grazing

Livestock grazing began in the CESAs concurrently with the start of mining in the 1860s. Grazing occurs on Federal lands primarily in spring and summer with some use in fall before livestock return to private lands. Grazing is expected to remain a primary use of Federal lands in the CESAs. Grazing management may be modified in the future based on allotment specific conditions to meet long term resource objectives and issues that arise, such as new management constraints related to ESA listed species. Grazing permits would be renewed every 10 years, and the fundamentals for rangeland health would be met or significant progress toward achievement made (43 CFR 4180). Acreages associated with grazing allotments are presented by CESA in Table 5.1-2.

5.1.2.4. Agriculture

The majority of the private land in the CESAs is along the major valley floors bisected by US Highway 93 and SH 75, and have a mixture of agricultural and residential development. Hay production is the dominant agricultural activity in the CESAs. Subdivision of ranches along the Salmon River has resulted in the conversion of agricultural land to residential use, yielding pockets of residential development separated by relatively large areas of agricultural land. As only 5.8 percent of Custer County is private lands (Table 5.1-1.), the trend toward decreasing amounts of agricultural land and increasing amounts of residential land in many of the CESAs will probably continue in the future.

5.1.2.5. Mining

McHugh et al. (1991) report that as early as 1862 prospectors were searching the valleys of the Salmon River for gold. The discovery of gold placers in Stanley Basin in that year led to a tradition of mining that continues today in Custer County. Precious metals were discovered in the county in the Bayhorse mining district in 1864 (ISHS 1980), and in 1866 gold was discovered in the Yankee Fork Salmon River (HCA 2013). The best placer deposits were found and depleted within a few years, after which attention turned to precious-metal lodes which were mined in the 1870s and 1880s. Attention then focused on base-metal lodes which were mined in the late 1800s and early 1900s. The production of base metals diminished after World War I, but some production continued into the 1980s. The production of copper, lead, zinc, and tungsten were important for the region during World War II. Molybdenum was discovered in 1967 and development of high-quality, building stone deposits began in the 1970s (Gardner 2008, McHugh et al. 1991).

Prospecting and small-scale mining continued until 1880 when the smelter was constructed at the Bayhorse Townsite, after which mining activity dramatically increased. The IGS (2013) documents 980 prospects and mines in Custer County, including mines near the project area such as the Buckskin mine, Clayton mine (and smelter), Ramshorn mine, Redbird mine, and Twin

Apex mine (Appendix 5A). Acreages associated with mining activities are presented by CESA in Table 5.1-2.

5.1.2.6. Recreation

Recreation in the CESAs consists primarily of fishing, hunting, camping, OHV use, hiking, antler shed hunting, and general enjoyment of the outdoors. Less commonly there is horseback riding, skiing, mountain biking, rockhounding, wildlife/wild flower viewing, nature photography, berry picking, backpacking, scenic viewing, etc. Many people from outside Custer County come to the county to recreate, e.g., outfitters and guides provide hunting, floating, and fishing opportunities along the Salmon River in the CESA (Section 3.12). The population of Custer County has been nearly constant since 2000, but the population of Idaho increased during 2000 to 2010 by 21.1 percent (Section 3.13.2.1). Therefore, there continues to be an increase in the number of people recreating in Custer County, and land management agencies will place a greater emphasis in the future than in the past on facilities development and management of recreational activities to reduce their effects to natural resources and to reduce conflicts between user groups. Disturbance associated with 4WD roads is presented by CESA in Table 5.1-2.

5.1.2.7. Residential development

Residential development has increased over time, although the majority of the CESAs remain undeveloped. Residential development is focused along the main valley floors which are bisected by highways and rivers, with scattered development along the lower edges of foothills with scenic views. The four main settlements in Custer County include the towns of Challis, McKay, Stanley, and Clayton. In the early 1980s several hundred houses were constructed for the TCM. There was an estimated 3,100 housing units in Custer County in 2012 (U.S. Census Bureau 2014). There is very little new development within the county because 92.5 percent of the land is under Federal administration (Table 5.1-1). Only 4.8 percent of Custer County is privately owned and available for residential or agricultural development/conversion. The amount and pattern of residential development in Custer County will likely continue in a similar manner.

5.1.2.8. Timber harvest/vegetation management

Forest management practices such as selective thinning and prescribed fire are implemented by BLM and the SCNF to help restore overstocked stands to more natural historic levels. Objectives are to improve forest health, decrease hazardous fuel loading, improve wildlife habitat, and stimulate aspen growth. Vegetation management practices can include spraying, mechanical crushing, and seeding treatments. The purpose of these treatments includes reducing sagebrush cover, restoring herbaceous understory, and increasing the amount of grasses available for livestock and wildlife.

The CESAs contain weed infestations that are small, localized, and usually associated with some sort of disturbance; however, many species of noxious weeds are found in Custer County and adjacent counties and it is probable that they will eventually be found in the CESAs. Weeds can be treated by means of chemical, biological, and mechanical methods.

5.1.2.9. Land jurisdiction

Federal agencies dispose of land through sales and exchanges that are identified for disposal in land use plans. These land jurisdiction activities typically result in a net decrease in the area of Federal lands. One such project was the Redbird Mine Land Sale, a 298-acre parcel transferred from Federal administration to private ownership. Another recent project was the Birch Creek Land Exchange in which the BLM acquired 350 acres in exchange for 270 acres transferred to the Nature Conservancy. Land exchanges are a means to consolidate land ownership and/or acquire valuable conservation and recreation lands. Public land statistics from BLM and Forest Service indicate a small but steady decline in Federal land. For example, SCNF legal acres decreased from 4,237,004 acres in 2002 to 4,235,940 acres in 2012 (USFS 2014), a difference of 1,064 acres. Although this represents less than a 1 percent change, it indicates a decline in Federal lands due to land exchanges and land sales. The trend in the future would be similar to slightly less Federal land loss due to the US policy of land retention pursuant to the FLPMA.

5.2. Geologic Resources and Geotechnical Issues

5.2.1. Introduction

The CESA for geologic resources is the Thompson Creek and S. [2] Creek 5th level watersheds (127,002 acres) (Figure 5.2-1). The CESA for minerals is Custer County (3,161,469 acres), but with national and global molybdenum markets also considered (Figure 5.2-2). The potential effects to geologic resources would be changes to the availability or quantities of mineral resources, especially molybdenum, and changes in topography/geologic exposure. Wildfire, grazing, agriculture, recreation, residential development, and timber harvest do not contribute to cumulative effects to geologic resources.

Geotechnical effects (slope stability hazards) are not evaluated in this chapter because there would be no meaningful slope stability hazards from the WRSFs, pit, or the TSF under any of the MMPO alternatives. Effects of the MMPO alternatives on paleontological resources would be negligible and are not further evaluated in this section.

The effects of the MMPO alternatives on geologic resources would be confined to the mine site, and the 5th level watershed scale in the mine locality would provide a reasonably broad area for cumulative effects analysis. The effects to minerals from the MMPO and land disposal action alternatives would be generally limited to Custer County except those effects involving the Garden Creek property (e.g., the property would become open to leasable, salable and locatable mineral actions under Alternative L2 and perhaps Alternative L4 or Alternative L5). In addition, the molybdenum produced under the MMPO alternatives would affect the national and global molybdenum market.

[2] *Squaw Creek* is an official place name in Custer County, and appears in numerous published documents including US Geological Survey topographic maps. The name was established by the US Board of Geographic Names to maintain uniform geographic name usage throughout the Federal Government. However, the word *squaw* is offensive to some people including the Shoshone-Bannock Tribes. Therefore, *Squaw Creek* is hereafter referred to in the main text as *S. Creek*.

5.2.2. Past, Present, and Reasonably Foreseeable Actions

Custer County has an extensive history of mining with some 980 recorded prospects and mines (Section 5.1.) (IGS 2013). The most important minerals by value extracted in the county are molybdenum, silver, building stone, lead, zinc, copper, gold, tungsten, and fluorspar. Essentially all of the molybdenum produced in the county is from the TCM (Gardner 2008). Further, the current mineral production in Custer County is nearly all (by value) from the TCM, followed by salable minerals from rock pits (sand and gravel, rip-rap, etc. from ~ 100 active rock pits), and flagstone (Three Rivers Stone quarry and Ramshorn quarries). The Persistence mine (formerly known as Rat's Nest mine) also produces a few hundred pounds a year of specimen mineral crystals (heulandite).

The current mines would be expected to continue operations for the foreseeable future, with intermittent closures typical of the mining industry. A small rock pit (~ 4 acres) would continue to be developed in Custer County perhaps once every year or two. There could also be exploration operations at a few historic sites such as the Clayton Silver mine, the IMA mine, or the Stanley area uranium prospects, as well as at the active mines and at the active Trail Creek agate and jasper exploration projects (Gardner 2008, 2013b). The IMA mine is a molybdenum prospect, but would not be developed in the foreseeable future. There are no reasonably foreseeable new mines (locatable, salable, or leasable) that would substantially affect mineral resources in Custer County (Gardner 2013b).

The BLM would probably not authorize the disposal of quartzite rock from the Broken Wing Ranch as there would be several sources of the same material in the locality. There are sufficient molybdenum resources in the US and the world to supply demand for the foreseeable future (USGS 2012a), and new mines will be developed or production at existing mines will be increased to meet the US and world molybdenum demand.

The TCMC-Forest Service land exchange proposal (if approved) would reduce the Federal land available near the mine for locatable, salable, or leaseable mineral actions by approximately 2,850 acres. However, this land has not been available for locatable mineral entry by anyone other than TCMC since the late 1960s and early 1970s due to mining claims controlled by TCMC that cover the land, and no leaseable or salable mineral actions would occur at the land in the foreseeable future. The land exchange proposal would make approximately 260 acres[3] of private land available for locatable, salable, or leaseable mineral actions in Custer County.

5.2.3. Cumulative Effects

There would be no actions besides the MMPO alternatives that would meaningfully alter topography and geologic exposure in the geologic resources CESA (the Three Rivers Stone quarry is outside the CESA). There would be no actions besides the land disposal alternatives that would meaningfully alter access to geologic exposure (the Broken Wing Ranch would provide public access to a number of geologic features, but none of the features would have known exceptional scientific interest).

[3] which would not include Livingston Mine parcels (~ 145 acres) which is withdrawn from future mineral actions

Figure 5.2-1. Geologic and soil resources CESA.

Figure 5.2-2. Minerals and air quality CESA.

There would be no molybdenum produced in the minerals CESA apart from that produced by the TCM. The molybdenum produced under the MMPO alternatives would not meaningfully affect the US or world molybdenum resources, and would reduce the US reserves by only 2 percent. There would be no potential disposals of salable minerals (e.g., quartzite at the ranch) that would affect mineral production in the minerals CESA. There would be over 8,000 acres in Federal lands transferred to private ownership (i.e., land disposal alternatives, TCMC-Forest Service land exchange) that would no longer be available for locatable, salable, or leasable mineral actions under Federal laws and regulations. However, some 80 percent of this area has not been available, and would not be available for the foreseeable future, for locatable mineral actions by anyone other than TCMC due to mining claims on the area owned by TCMC.

5.3. Soil Resources

5.3.1. Introduction

The CESA is the Thompson Creek and S. Creek 5th level watersheds (127,002 acres) (Figure 5.2-1). The CESA encompasses two watersheds due to the effect that soil disturbance would have on surface water quality through erosion, soil loss, and sedimentation. Soil resources outside the watersheds would not be affected. Direct effects would be limited to primary disturbed areas, and indirect effects (e.g., erosion and sedimentation of streams) would be limited to proximal downstream areas.

The use of OHVs disturbs soil, but the effects are inconsequential compared to the effects on soil from mining, roads/utilities, residential development, wildfire, livestock grazing, timber harvest, etc. Apart from actions which remove soil, equipment used to remove and haul timber causes compaction that further increases the erosion potential of soil by increasing run-off and decreasing infiltration. Roads can alter water flow on the soil surface, creating impervious surfaces that concentrate run-off and increase erosion. There are 165 miles of road (334 acres) and 50 miles of utility ROW (303 acres) in the CESA (Table 5.1-2). The primary effect of these activities on soil resources is increased erosion of in-situ soil with the secondary effect of increased sediment loading in downstream surface waters.

5.3.2. Past, Present, and Reasonably Foreseeable Actions

The area of past wildfire and prescribed burning in the CESA is 1,193.4 acres (0.9 %) (Table 5.1-2). Wildfire and controlled burning for forest fuel management on Federal lands increases soil erosion by removing the organic material from the soil surface. Extremely hot fires have the potential to permanently alter the top layers of the soil, changing the soil structure, productivity, chemistry, and erosion potential. In the CESA, soil effects from fire have varied by location, timing of the fire, soil and vegetation type, and post-fire environment.

Livestock grazing may affect soil by decreasing the vegetation cover, destroying the microbiotic crust, increasing compaction, and thereby increasing the surface erosion of soils. Localized damage in riparian areas from compaction and vegetation removal by cattle can occur, allowing sediment to enter the waterway and contributing to the destruction of the stream banks. This past and present vegetation and soil loss condition due to grazing uses in the BLM Challis Field Office area and SCNF is applicable to the CESA and is expected to continue in the foreseeable future.

The effects to soil from recreation are limited to compaction from vehicle travel and recreation facility development, such as campgrounds. Soil would be displaced from roads as fugitive dust, but would settle on nearby travel routes, i.e., no appreciable amounts of soil would be removed from the CESA as fugitive dust.

Road development can cause disturbance, run-off, and off-site sedimentation. The nature and extent of the effect varies with the type of road, the extent of use, and the level of maintenance. For example, primitive 4WD roads, OHV trails, and power line service roads are naturally surfaced, rarely used, and almost never maintained, making them potentially susceptible to gullying and rilling, especially on grades. These are the most common types of roads, comprising approximately 132 miles or about 58 percent of the disturbance associated with all roads in the CESA (Table 5.1-2). Approximately 192 acres or about 0.2 percent of the CESA is at potential risk of water erosion and off-site sedimentation as a result of roads.

An additional 34 miles of naturally surfaced, gravel-surfaced, bladed, and paved roads exist across the CESA. Although the extent of use and level of maintenance varies, these roads typically are used more often and receive a higher level of maintenance than primitive roads and trails. Most of these roads have engineered prisms and appropriately spaced culverts to drain run-off. As a consequence of these factors, these roads are less likely to erode, though run-off and off-site sedimentation may still occur. Approximately 140 acres of natural soil surface has been disturbed by the construction of these road types.

Utility development has disturbed about 50 miles in the CESA; with an estimated disturbance width of 50 feet, this represents 303 acres of disturbance (Table 5.1-2). Utility corridors are generally reclaimed and seeded while others in the past may have become naturally vegetated. Some disturbance may naturalize within a few years where as others may take twenty plus years to naturalize. Until the disturbance is restored, it remains a potential area for erosion.

Of all the land uses in the CESA that can affect soils, the most substantial one is mining. Soils disturbed by mining are removed and then replaced during reclamation activities, or are buried in place destroying soil textures and biological crusts. Mining and mineral material development has removed top soil and exposed subsurface soils across approximately 2,950 acres or 2.3 percent of the CESA. These areas may no longer contain adequate vegetation to hold soil in place and are susceptible to both wind and water erosion. Some restoration work has occurred at the mine sites to limit the amount of soil erosion, but bare soil still remains in places.

Residential and agricultural land use conversion has affected soils in the CESA. The disturbances associated with residential and agricultural development have resulted in the removal of natural vegetation, disruption of natural soil horizons and alteration of soil chemistry. Less than 5 percent of the CESA is private lands which limits disturbance associated with these actions.

Timber harvest/vegetation management activities remove vegetation which potentially increases soil erosion. Instream habitat projects have been completed to remove fish barriers and allow for fish migration to occur. These projects include short-term soil and vegetation disturbance when these projects are installed. To mitigate this, some projects reclaimed areas by contouring the

soils and seeding the area to provide a perennial vegetative cover to protect soils and provide native plants.

Change in land jurisdiction itself does not always affect soils; however, the actions that may occur on those lands as a result of ownership transfer may. In general, the reasonably foreseeable actions in the CESA that may affect soils would be mining, livestock grazing, and recreation activities such as continued use of 4WD roads. Additional residential and agricultural land use conversion would be limited by the amount of private lands within the CESA (4.8 %).

5.3.3. Cumulative Effects

Cumulative effects to soils for all MMPO action alternatives would be associated with soil burial and soil loss. Biological activity and organic matter would be reduced in salvaged soils stored for a period of years prior to reclamation. Erosion on roads and land affected by the mine would be controlled with BMPs. Elsewhere on BLM and Forest Service lands similar BMPs would be used for any new activities. Historic mining activities and cleanup actions in the CESA have resulted in loss of soils and long-term soil productivity. Some areas of historic mine wastes associated with abandoned mine sites would continue to exhibit metals release from exposed mine wastes, limited revegetation, and higher than natural erosion rates.

Erosion and soil loss would continue to be associated with future wildfires, road construction and use, and noxious weed infestation in the existing mining area. In the short-term, during mine operations there would be a temporary decrease in soil functions in newly disturbed areas. Following growth medium replacement and reclamation, there would be no substantial net decrease in growth medium productivity. Proposed road reclamation would result in a net decrease in road density and an associated long-term increase in vegetated area and soil productivity over existing conditions.

5.4. Vegetation, Forest Resources, and Invasive and Non-native Species

5.4.1. Introduction

The CESA is the Thompson Creek, S. Creek, and Bayhorse Creek 5th level watersheds (213,514 acres) (Figure 5.4-1). Effects to vegetation, forest resources, and invasive and non-native species from the MMPO and land disposal alternatives would be limited to within these watersheds and cumulative effects to these resources would be most important on a watershed scale.

Cumulative effects could include changes to or decrease in vegetation cover, which in turn affect ecosystem processes and habitat functionality. Disturbance of vegetation in the CESA occurs primarily through activities related to mining, agriculture, timber harvests, grazing, wildfires, prescribed burns, and OHV use. According to the BLM and Forest Service corporate GIS data and the GAP Analysis Program (GAP) data, the montane forest-steppe transition (38.3 %), shrub steppe and grasslands (28.5 %), and montane forests (18.9 %) are the major vegetation types that cover 85.7 percent of the CESA (Figure 5.4-1). A substantial land use in the CESA that affects vegetation is mining, with 6 current and 36 past mine operations in the CESA (USGS 2005). Not including mining disturbance, 1,860.5 acres (0.9 %) of the CESA have been affected by past

and present land uses/disturbance to vegetation (Table 5.1-2). Increased use of roads can lead to the spread of invasive and non-native plants into mining disturbed areas.

Nearly 390 miles (33.8 miles Federal and State highway, 55.2 miles local road, and 300.3 miles unimproved/4WD road) of roads in the CESA affect soil and vegetation. In the case of large expanses of unfenced public lands (such as BLM land), existing roads can result in creation of other user-defined roads. Some OHV users drive off road to access an area they want to reach. Soil disturbance from vehicles operated off-road are often slow to recover, and attract future, additional vehicle use. Disturbed areas are more likely to become infested with invasive and non-native species, and vehicles can spread seed from these species.

As private lands are converted from traditional agricultural utilization (ranching) to more residential and recreational utilization, affects to vegetation resources include changes in vegetative composition and possible elimination of vegetation in some areas.

Mining disturbance to vegetation can be long-term at historic mining operations that have not been actively reclaimed. Reclamation, either human-performed or natural, has caused various levels of revegetation of these disturbed areas. Effects associated with timber harvests and vegetation management can include changes in species composition, decrease in habitat, habitat fragmentation from road construction, and an increase in soil erosion.

Grazing activities can result in specific, localized impacts in riparian areas from vegetation removal by cattle as well as increasing the introduction and spread of noxious and non-native vegetation species. The allotments in the CESA are in good condition and meeting rangeland health standards (P. Redick 2014). Change in land jurisdiction itself does not affect vegetation; however, the actions that may occur on those lands as a result of ownership transfer may affect vegetation.

Table 5.4-1. Vegetation types in the CESA.

Vegetation type	acre	%
Alpine	1,627.8	0.8
Cultural landscapes (agricultural cropland and pasture)	1,698.5	0.8
Montane forest-steppe transition	81,689.9	38.3
Montane forest	40,315.8	18.9
Montane shrubland	658.4	0.3
Riparian and wetland	2,759.9	1.3
Shrub steppe and grasslands	60,796.0	28.5
Subalpine forest	12,921.7	6.1
Subalpine parklands	11,046.1	5.2
TOTAL	**213,514**	**100.0**

Figure 5.4-1. CESA for multiple resources.
Vegetation, forest resources, invasive and non-native species, wetlands, floodplains, and riparian areas.

5.4.2. Past, Present, and Reasonably Foreseeable Actions

Past timber sales and fuels reductions projects have reduced stand densities, simplified stand structure, and have resulted in the partial treatment of created fuels (logging slash) through the use of thinning, fire, and mechanical means. Approximately 5,000 acres in the CESA have been treated with prescribed fire or mechanical thinning in the recent past. Forest product extraction (including fuel, posts, poles, plant gathering, and Christmas trees) has affected minor amounts of forest resources throughout the CESA. Grazing activities also occur throughout the majority of the CESA. Livestock grazing has and would continue to utilize the grass/forb species, reducing competition for natural regeneration of tree/shrub species.

Wildfire burning of 2,717.5 acres in the CESA (1.3 %) changes the maturity of an area's vegetation, can affect the vegetative composition of an area, and can result in the spread of non-native and invasive weeds with disturbance in addition to the burn. Controlled burning of vegetation is used to maintain and enhance desired habitats and to reduce hazards from wildfires. Regarding noxious weeds, 1,676 acres of quantifiable past and present surface disturbance (i.e., roads, utilities) have introduced and/or increased the susceptibility for the establishment of noxious weeds in about 0.8 percent of the CESA. Invasive and non-native species are not prevalent in the CESA. Some invasive and non-native species do occur, but they are usually small in size and associated with disturbance such as roads.

The disturbance at the TCM is 2,822.6 acres. The total area of disturbance from other mining in the CESA is not known as the disturbance at numerous historic mines in the area has not been quantified. Approximately one-third of the CESA is in BLM grazing allotments (Table 5.1-2). Grazing also occurs on NFS and private lands in the CESA. Livestock grazing has utilized and continues to utilize the grass/forb species, reducing competition for natural regeneration of tree/shrub species. In addition, grazing activities can result in specific, localized damage in riparian areas from vegetation removal by cattle as well as increasing the introduction and spread of noxious and non-native vegetation species. Some allotments in the vegetation CESA have been found to have substandard conditions, such as adversely affected vegetative cover and riparian areas, most of which were created by historic grazing practices.

The reasonably foreseeable developments in the CESA that could affect vegetation include ongoing mining, livestock grazing, and recreation. No timber sales or prescribed burns are reasonably foreseeable in the vegetation CESA in the current SCNF planning cycle. Forest product extraction (including fuel, posts, poles, plant gathering, and Christmas trees) would continue to affect minor areas of forest resources throughout the CESA. Changes to private agricultural lands in the CESA are likely; however, specific plans for such conversions are unknown and cannot be reliably evaluated. Wildfire effects in the CESA cannot be reliably evaluated, but it is probable that natural and man-caused wildfires will continue to affect vegetation in CESA in the future.

Expansion of mining activities is likely to occur in the future. At this time, known plans include the TCM mine and the Three Rivers Stone quarry, and if the Sandy J placer exploration and TCMC exploration projects are successful, there could be proposals for new mining operations. In addition, it is likely that extraction of decorative flagstone from the Ramshorn quarry will continue on private lands. Expansion of mining activities would have effects on vegetation in

the CESA. If resource development continues in the future, effects to vegetation would increase in area as well as intensity.

Grazing on BLM and NFS land would continue in allotments of the CESA in the reasonably foreseeable future. Per the Challis RMP (BLM 1999) and Challis National Forest LRMP (USFS 1987), the goal is to manage vegetation resources to achieve or maintain resistant and resilient ecological conditions while providing for sustainable multiple uses and options for the future across the landscape. These resistant and resilient ecological conditions include healthy, productive, and diverse populations of native or desirable non-native plant species appropriate to site characteristics. In addition, the RMP and LRMP specify goals and objectives to meet range health standards, which are directly related to vegetative cover. Grazing on private lands would also continue.

Future range health on public lands would be anticipated to improve. The BLM and SCNF will continue to monitor and evaluate allotments to determine if they are continuing to meet or are making meaningful progress to meeting the standards for rangeland health, and management prescriptions adjusted accordingly. Any future changes to grazing management on these allotments would be designed to improve range conditions, which would also result in improvements to vegetative communities.

5.4.3. Cumulative Effects

Past timber harvest and vegetation management projects have resulted in short-term effects from removal of vegetation and potential increases in noxious weeds on disturbed soils. However, there are indirect, long-term effects related to protecting vegetation from the effects of fire and improving conditions for other vegetation types.

In total past, present, and reasonably foreseeable disturbance would result in disturbance to 3.7 percent of the CESA vegetation. However, historic disturbance is in various stages of natural revegetation. A smaller amount of the cumulative disturbance is due to roads and trails which permanently replace native vegetation with an exposed native surface. Vegetation generally quickly re-establishes in disturbed areas, although the vegetation composition and community type is typically modified compared to prior to disturbance.

In terms of cumulative effects to special status plant species, the MMPO action alternatives would not directly disturb any special status plant species. There would be a slight increase in cumulative effects to suitable habitat for special status plant species, in particular whitebark pine.

Past, present, and reasonably foreseeable actions would increase the cumulative effect of disturbed acres susceptible to noxious weed invasion to about 1.0 percent. However, improved prevention measures and control/treatment requirements would limit this overall cumulative effect in the CESA.

Under Alternative L2-B the irrigated cropland (424 acres) at the ranch would be converted to sagebrush grassland, increasing the sagebrush steppe and grasslands by 0.7 percent and decreasing the agricultural cropland and pasture by 23.6 percent in the CESA (Table 5.4-1).

5.5. Range Resources

5.5.1. Introduction

The CESA includes the allotments which contain any portion of the MMPO and land disposal alternative footprints. The CESA includes four active BLM grazing allotments (Thompson Creek, S. Creek, Bald Mountain, and Split Hoof), one closed BLM allotment (Bruno Creek), and one vacant Forest Service allotment (Salmon River Breaks) for a total of 94,722 acres (Figure 5.5-1). The current permitted AUMs for the four active BLM allotments total 883 AUMs on 35,925 acres. Portions of each of these allotments are in the project area and would be affected by the project. The Salmon River Breaks Allotment includes 441 AUMs and is 56,285 acres in size. Although the allotment is currently vacant, it is still a viable allotment for grazing and treated as open. Historically grazing occurred on the Bruno Creek BLM Allotment. The Bruno Creek Allotment, currently closed due to mining activity, was located between the S. Creek and Thompson Creek allotments and included 130 AUMs and 2,511 acres. It is listed in the Challis RMP under Livestock Grazing Goal 1: Decision 3(a).

Livestock displaced from the project area due to the alternatives would move to other portions of the allotments. There would not be any effect to grazing or range resources on the Garden Creek property; therefore, no allotments associated with the Garden Creek property were included in the CESA.

Effects associated with timber harvests and vegetation management can include changes in species composition that can benefit livestock. Noxious weed infestations from disturbance such as mining reduce usable range and available forage in the S. Creek area (BLM 1999).

Cumulative effects to range resources in the CESA primarily occur from roads, wildfires, livestock grazing, and mining. These activities reduce the AUMs available for grazing, change the distribution of livestock on the allotments, may affect the timing of grazing, and can result in adverse effects to the resource such as spread of noxious and non-native, invasive weeds, or elimination of vegetative cover.

5.5.2. Past, Present, and Reasonably Foreseeable Actions

Livestock grazing is permitted on approximately 35,925 acres of BLM land in the CESA; no grazing is authorized on the BLM's Bruno Creek Allotment or the NFS land in the CESA. Mining and some limited residential development has encroached on lands used for grazing and reduced the amount of land and forage available in the Thompson Creek, S. Creek, Bald Mountain, Split Hoof, Bruno Creek, and Salmon River Breaks allotments. Invasive and non-native species are not prevalent in the CESA. Some invasive and non-native species occur, but they are usually small in size and associated with disturbance from such actions as roads.

Eighteen past and four current mining operations are in the CESA. The area disturbed by extractive industries has reduced the area and the AUMs available for grazing in the CESA. The Bruno Creek Allotment was closed in 1981 due to mining, which resulted in a decrease of 130 AUMs.

The CESA for range resources contains over 211 miles (312.5 acres) of roads (Table 5.1-2). Existing roads provide access to allotments but can also affect livestock by separation of grazing allotments and through collisions between livestock and vehicles. Given that roads only occupy 0.3 percent of the CESA, the effects on AUMs from roads are negligible. Utility ROWs in the range CESA have affected 53.3 miles (323 acres or 0.3 %). Although ROWs are reclaimed, vegetation management in the ROW continues and may or may not provide forage.

Livestock grazing is expected to remain as a primary public land use within the CESA and managed relatively in the same manner as currently being managed. Grazing permit renewals would continue to occur every ten years and would require that the fundamentals for rangeland health (434 CFR 4180) are being met. At the time of the permit renewals, permit modifications may occur to ensure compliance with the fundamentals of rangeland health. Changes may occur to the timing of grazing use, modifications to the grazing use criteria, duration of use, permitted AUMs, and authorization of additional range improvements (fences, water developments, etc.). No changes to livestock grazing are proposed at this time.

The foreseeable future disturbance in the range resources CESA includes a proposed land exchange between the Forest Service and TCMC. Under this proposal, ~2,850 acres of NFS land would become private and potentially unavailable for livestock grazing; 622 acres of this land would be within the Salmon River Breaks Allotment, resulting in a 1.1 percent decrease in the allotment and available AUMs.

The pattern for wildfires would continue into the reasonably foreseeable future. Wildfires would continue to occur in mid-July to the end of August typically caused by dry lightning. The trend for wildfire within Idaho seems to be moving to larger, longer lasting fires. Although the lands within the CESA may not see as large of fires, fire size may increase with more fine fuels available due to the reduction in authorized AUMs for livestock.

Increased recreational pressure on the Federal lands in the CESA would likely increase vehicle traffic including OHV use. This would cause increased soil disturbance that could lead to increased weed infestations. The potential for the spread of noxious weeds from OHVs is greater than the potential for the spread of invasive and non-native species from vehicular traffic on roads as there is increased soil disturbance and greater potential to encounter and pick-up invasive and non-native seed when traveling off of designated or maintained travel ways. These effects could result in degradation of range resource quality.

In the reasonably foreseeable future, the 2008 Travel Management Plan (BLM 2008c) would continue to be implemented on BLM lands. These actions are not expected to cause any change to the lands available to grazing or to the number of AUMs authorized for grazing.

5.5.3. Cumulative Effects

Mining disturbance can affect an allotment by removing forage vegetation (a loss of AUMs) until reclamation of the disturbed area is completed. Grazing on reclaimed areas is typically restricted until the land management authority accepts the reclamation as being ready for grazing. In addition to this temporary restriction on grazing in the mine area, mining disturbance (including roads) can also restrict movement of livestock in an allotment.

Figure 5.5-1. Range resources CESA.

In many cases, the change from a pre-mine forested environment to reclamation grasslands can be a beneficial change for grazing animals. Over the short term, the replacement of forest by grasses could increase the amount of suitable forage for cattle and sheep, but this would not be reflected in the number of AUMs available for grazing.

With proper livestock grazing management, sufficient residual cover and litter would remain to prevent and/or limit the spread of noxious and invasive species. Weed abatement efforts by the BLM and the SCNF would continue.

The CESA contains a number of BLM and Forest Service roads providing good access for trailing grazing animals into the allotments. The land disposal alternatives would allow for continued access. Livestock grazing would continue to be one of the primary uses of the resources of the land in the BLM Challis Field Office area.

The CESA for range resources is 94,722 acres of BLM, Forest Service, and State lands which provides 883 active AUMs and 441 vacant AUMs. In the CESA, mining activities caused the closure of the Bruno Creek Allotment, a decrease of 130 AUMs. Under the land disposal Alternatives L2 through L4, up to approximately 5,100 acres of BLM grazing lands (up to 13.8 % of the BLM land in the CESA) would become private and unavailable for livestock grazing. Acquisition of the offered lands would potentially provide almost 900 acres of land and up to 2,400 AUMs, although it is unlikely the ranch would be entirely available for grazing. This would be a cumulative increase in AUMs available. However, under Alternative L2-B, no grazing would occur on the ranch. Grazing would not change on the Garden Creek property. Future actions such as the TCMC-Forest Service land exchange together with the MMPO and land disposal alternatives would potentially cause a reduction of another 622 acres and the associated AUMs in the CESA.

When added to past, present, and future activities in the CESA, there would be a cumulative decrease or increase in AUMs depending on acquisition and grazing use of lands on the ranch. As mining areas are reclaimed, their rangeland capacity would be restored. Conversion of agricultural lands to other land uses would constitute a cumulative effect to range resources since permittees rely on private agriculture lands (i.e. hayfield stubble) for fall, winter, and early spring grazing. Less than 6 percent of Custer County is private lands and private pasture is limited. Without having the private agricultural lands, permittees would have to reduce herd size, buy more hay to feed livestock, or find private pasture outside of Custer County to feed livestock during that time their livestock are not grazing on public lands.

A cumulative decrease in forage (AUMs) would permanently decrease the availability/accessibility to forage on BLM land, which would affect livestock distribution in the CESA (i.e., more grazing pressure on private lands in the CESA).

5.6. Water Resources

5.6.1. Introduction

The CESA for surface water and groundwater is the Thompson Creek, S. Creek, and Bayhorse Creek 5th level watersheds, plus the Salmon River from its confluence with Thompson Creek

downstream to where effects would not be detectable, if residual effects would extend that far (214,506 acres) (Figure 5.6-1). The CESA was established considering the following information. First, changes in water quality/quantity due to the mine would occur in the drainages downstream of the WRSFs, the open pit, and the TSF (i.e., Buckskin, Pat Hughes, No Name, Bruno, and Redbird creeks), and could continue downstream into Thompson Creek, S. Creek, and the Salmon River. Second, deeper, regional aquifers have not been affected by the mine to date. Only the water quality of shallow aquifers just downgradient of the WRSFs and the TSF have been measurably affected by the mine (Section 3.6). However, since the local aquifers discharge to local streams (i.e., Thompson, Bruno, S. , Redbird, and No Name creeks) effects downstream of the discharge points would most likely be through mixing with surface water. Third, the management of the Broken Wing Ranch has the potential to affect water resources, most likely through changes in water use.

Potential cumulative effects to surface water resources in the CESA can occur from road construction and maintenance, livestock grazing, timber harvesting, agricultural activities, mining, and any other water consuming or ground disturbing activities. These activities primarily can affect surface waters by introduction of sediment. This can occur via accelerated upland soil erosion and/or streambank erosion from increased water yields off of disturbed ground. Further, mining activities in general affect surface water due to suspended sediment and dissolved constituents from mine workings and wastes. Specifically, the Twin Apex mine is responsible for a large percentage of the baseflow in lower Bruno Creek, as it discharges groundwater from the abandoned portal. This discharge contributes antimony, cadmium, lead, and zinc to Bruno Creek.

The MMPO alternatives could cause cumulative effects to groundwater related to groundwater withdrawal, such as from wells or groundwater interception, and from contaminant effects to groundwater downgradient of mine facilities. Groundwater withdrawals may result in a reduction in discharge which would be manifested as reduced streamflow in the receiving streams or reduced availability for other groundwater users downgradient of the mine. A greater percentage of mine-influenced groundwater than is currently captured would be captured by cutoff walls below the WRSFs under all MMPO alternatives by the end of Phase 7 and/or Phase 8 operations. Contact with oxidized sulfide minerals and other disturbance has the potential to acidify groundwater, release metals, and cause other chemical changes; this contact may occur when snowmelt, for example, infiltrates a WRSF and seeps through the subsurface.

Cumulative effects to groundwater in the CESA would consist of groundwater withdrawals from wells or chemical effects caused by surface land uses that contribute contaminants to the groundwater under or downgradient of these land uses. Therefore, timber harvesting, grazing, utilities, and recreational uses have little effect on groundwater resources. Mining in the CESA has the greatest potential to affect groundwater by withdrawal for consumptive use or from infiltration from open pits and seepage through overburden disposal fills, which have the potential to affect groundwater quality. Many mines have operated and closed in the CESA. The active mines in the CESA include the TCM, the Ramshorn Slaty quarry, and the Three Rivers Stone quarry. Mining is likely to continue in the CESA in the future.

Figure 5.6-1. Fish and aquatic, water resources CESA.

The IDWR (2012) well database shows that TCMC is the sole user of groundwater in the Thompson Creek, Bruno Creek, S. Creek, Redbird Creek, and No Name Creek basins. Along the Salmon River downstream of its confluence with Thompson Creek and upstream of the confluence of the East Fork Salmon River and the Salmon River, there are three wells that are used for irrigation and approximately 25 wells are used for domestic production; this suggests only minor impacts from agriculture and residential development. Areas of wildfires, utilities, and roads account for less than 2 percent of the CESA (Table 5.1-2.), so effects due to disturbance from these occurrences are limited. Actions associated with livestock grazing, timber harvest, and recreation do not typically affect groundwater.

Ultimately groundwater from the affected aquifers would discharge to, and mix with, surface water; therefore, cumulative effects of groundwater use or degradation would be manifested as changes in stream discharge or surface water quality.

5.6.2. Past, Present, and Reasonably Foreseeable Actions

5.6.2.1. Surface Water

The TCM is in two watersheds (Thompson Creek and S. Creek), both of which drain to the Salmon River. The CESA (Figure 5.6-1.) includes these areas as well as other areas both up- and downstream that also drain to the Salmon River. The primary features of the TCM with the potential to affect the quality of surface water are the WRSFs and the TSF. In addition, TCMC withdraws water from the Salmon River for mine operations.

The Broken Wing Ranch offered land is adjacent to the Salmon River further downstream from the TCMC operations; there would not be any cumulative effect related to the MMPO alternatives and the land disposal.

Reasonably foreseeable surface disturbance includes the expansion and reclamation of the TCM, continued mining in the CESA, continued drainage from the Twin Apex mine, and continued land uses and land management such as grazing, agriculture, timber harvest, road and utility development, etc. In addition, ore and tailings from the Tungsten Jim mine (20,000 cubic yards) and mill (10,000 cubic yards) could be removed from along Thompson Creek and encapsulated in the Pat Hughes drainage (~ 2 acres) below the Pat Hughes WRSF toe (Marek and Lechner 2011; Gardner 2013b).

5.6.2.2. Groundwater

Past and present disturbance with the potential to cumulatively affect groundwater quality in the CESA consist primarily of mining, both at the TCM and other past mining operations (Appendix 5A). As noted above there are three irrigation wells along the Salmon River between the confluence of the Salmon River and Thompson Creek and the confluence of the East Fork Salmon River and the Salmon River and approximately 25 domestic wells in the same area.

Reasonably foreseeable disturbance includes expansion and reclamation of the TCM, as well as continued mining at the Three Rivers Stone quarry and Ramshorn quarry, and any effects to groundwater from new mines, irrigation or domestic wells, or other uses.

5.6.3. Cumulative Effects

5.6.3.1. Surface Water

Unlike the area of erosion, the area of surface disturbance does not correlate well with cumulative effects (i.e., sediment delivery) to surface water. Effects from the area of erosion are distinctly affected by the distance to water, slope, etc. Furthermore, some of the listed projects (e.g., rehabilitation projects) when implemented would have a positive cumulative effect on surface water quality.

There would not be a measureable depletion of surface water quantity above negligible amounts from any of the alternatives, so there would therefore be no addition to cumulative effects to surface water quantity. Upon closure, there would be a net increase in water placed back into the Salmon River, which would offset other depletions from present or future activities. In addition, any use of surface waters from any of the past, present, or future activities, including those by TCMC, can only occur with the concurrence of the IDWR through possession of a valid water right. Water rights are granted and managed in such a way as to protect existing water uses as well as environmental and public interest factors.

While the MMPO alternatives all involve surface disturbance, there would be no measurable change in sediment loads under any of these alternatives. TCMC discharges from Outfall 001 and Outfall 002, which may contribute TSS during spring run-off, along with TSS from other activities in the CESA. These past or present activities, including some of those in Appendix 5A, may contribute to the 2010 IR (IDEQ 2011a) listing of the reach of the Salmon River between the mouths of Thompson and S. Creek as impaired for sedimentation/siltation. Upstream and downstream in the CESA, the Salmon River is listed as not impaired.

There would be cumulative effects to surface water quality from mining activities, resulting from a combination of groundwater seepage (past, present, and future) and treated pit water discharges (future). Primarily these are effects due to trace elements. TCM would manage discharges such that, once in the Salmon River, they would be sufficiently diluted to meet applicable WQSs. Furthermore, the Salmon River in the CESA is not considered impaired for beneficial uses due to any of the trace elements, according to the 2010 305(b) Integrated Report (IDEQ 2011a). However, their addition still represents a negligible degradation of the existing water quality.

Of the activities in the CESA (Appendix 5A), mining would have the greatest probability of contributing these kinds of constituents to surface water. For example, the Twin Apex mine probably contributes to the degradation of Bruno Creek, and the Tungsten Jim mine and mill may contribute metals to the adjacent Thompson Creek. Relocation of the waste material from the Tungsten Jim mine and mill to an encapsulation site (repository) in the Pat Hughes drainage would eliminate any metal loads to Thompson Creek from the Tungsten Jim sites, but any such metal loads would be very small, e.g., none have been inferred at the monitoring sites for the TCM.

All active mines must comply with discharge permits and regulate their discharges; WQSs in S. Creek, Thompson Creek, and the Salmon River are being met. The contributions of trace elements that mining is having on the Salmon River are currently at levels that are not affecting

beneficial uses in the river. The EPA has the ability to control point source releases through the NPDES program; the EPA would continue to do this by setting the necessary effluent limits on a case-by-case basis as needed to ensure that the desired water quality in the Salmon River is maintained. Therefore, cumulative effects to surface water resources from the MMPO alternatives would be negligible. There are no activities in the CESA that would result in cumulative effects to surface water under the land disposal alternatives.

5.6.3.2. Groundwater

In addition to past and present effects, implementation of any MMPO action alternative that increases the size of the WRSF relative to the size of the watershed would increase effects to groundwater by changing the ratio of infiltration water to groundwater inputs. The expansion of the Buckskin WRSF would not correspond with a change in groundwater infiltration. The Pat Hughes WRSF would increase in size from 142 million tons in 2010 to 205 million tons by the end of Phase 8. The other potential increase in cumulative effects would be if the open pit becomes a groundwater source from which mine-influenced water reaches Thompson Creek.

There would not be an increase in the rate of groundwater withdrawal for process or potable water under any of the MMPO alternatives; therefore, there would not be a cumulative effect to the aquifer associated with pumping. The overall stream flow in the CESA would not be cumulatively affected by changes in groundwater volume under the MMPO alternatives because the changes would be negligible under all alternatives. There would not be any cumulative effects to groundwater related to the land disposal alternatives, because groundwater use would not change.

5.7. Wildlife Resources

5.7.1. Introduction

The CESA includes all suitable wildlife habitats in a 15 mile radius of the center of the mine and selected land, and the center of the Broken Wing Ranch. The two 15 mile radii overlap yielding a CESA of 662,397 acres (Figure 5.7-1., Figure 5.7-2). Most effects to terrestrial wildlife would occur from the expansions of the WRSFs and the TSF, with minor effects to most wildlife and sensitive species from decreases in habitat under the MMPO alternatives. The CESA encompasses a realistic home range or movement radius for most species with minor effects to habitat (Section 4.7.), including wide-ranging species (i.e., big game, gray wolf, fisher, and wolverine) and migratory birds (primarily raptors, including boreal owl, flammulated owl, great gray owl, and northern goshawk). The CESA is also a realistic dispersal distance for pikas, for which moderate habitat effects could occur under the MMPO alternatives (including Alternative M1 - No Action). By focusing on the potential cumulative effects to the majority of species, which are likely to utilize a 15 mile radius from the project locations, the CESA captures the greatest potential effect to wildlife.

Cumulative effects to terrestrial wildlife and special status species would result if other past, present, and foreseeable future projects in the CESA were to have an incremental effect, when added to the MMPO alternatives, which passed a certain effect threshold for a particular species. In general, the threshold for a cumulative effect to a wildlife species in this discussion is a decline in the reproductive rate of a population, i.e., any effect that limits or lowers a wildlife

species' population or viability. These effects may include a reduction in local or regional population, population density, or habitat capability.

Only wildlife or special status species that would be affected (above a negligible level) by the MMPO alternatives is included in this discussion. The following special status species are not discussed because effects under the MMPO alternatives would be negligible: Canada lynx, spotted bat, Townsend's big-eared bat, bald eagle, brewer's sparrow, peregrine falcon, willow flycatcher, spotted frog, and garter snake. There would also be negligible effects on riparian species. In addition, certain effects are not discussed because they were found to be negligible for all terrestrial wildlife species (Section 4.7). Such effects include uptake of contaminants of concern, traffic increases, noise, and fragmentation.

5.7.2. Past, Present, and Reasonably Foreseeable Actions

The disturbance in the CESA includes that from mining, wildfire, existing roads, utilities, and livestock grazing (Table 5.1-2). However, the areas of disturbance from wildfire and grazing do not affect wildlife as much as the more permanent and more severe disturbance from the other categories, although grazing in some areas has likely changed the structure and composition of native plant communities (Ruediger et al. 2000).

Past and present disturbance from mining (2,822.6 acres from the TCM alone) in the CESA has fragmented habitats and displaced certain wildlife populations. Road and utility development can fragment and remove wildlife habitat, cause mortalities, and influence behavior. There are more than 236 miles (1,066 acres) of designated road routes within the CESA, not including 4WD trails. In addition, there has been 405 miles (2,454.5 acres) of utility disturbance. Past and present timber harvests in the CESA have resulted in habitat alteration in the form of forest removal followed by reforestation, with a short period of early seral conditions. Timber harvests and vegetation management treatments are generally favorable to big game as they reset successional changes to provide a variety of vegetation availability. Past and present recreational uses such as hunting, fishing, OHV and snowmobile use, camping, and picnicking have introduced human disturbance and noise in wildlife habitats.

Approximately 5 percent (33,837 acres) of the wildlife CESA occurs on private lands. Past and present actions on private land in the CESA have mainly included mining, grazing, and agricultural activities. Residential development has also occurred on the large ranches in the CESA. Specific effects to private lands in the CESA are difficult to quantify. Disturbance of wildlife habitat caused by these private land effects is also not quantified with existing data, but would be an area less than the private land ownership area (Table 5.1-1).

TCM operations, grazing on BLM and SCNF lands, timber harvests, road building/decommissioning and use, and recreational activities are expected to continue into the foreseeable future in the CESA and would continue to affect wildlife and special status species. Any future management activities on public lands must meet standards and guidelines developed to protect habitat for these species. Grazing in the BLM Challis Field Office area and the SCNF must be in compliance with standards and guidelines contained in the RMP and LRMP, respectively (BLM 1999; USFS 1987).

Figure 5.7-1. Wildlife and transportation CESA, selected land.

Figure 5.7-2. Wildlife CESA, Broken Wing Ranch.

5.7.3. Cumulative Effects

Past, present, and foreseeable actions in the wildlife CESA have resulted and will likely result in both beneficial and negative effects to wildlife and special status species. The foremost adverse affect to wildlife and special status species in the CESA has been and will be habitat modification.

The reasonably foreseeable (quantifiable) disturbances due to mining (i.e., TCM) and timber harvests/vegetation management, when added to the quantifiable past and present disturbances, would increase the disturbance of BLM and NFS land in the CESA to about 1.0 percent. Data from the GAP analysis program, BLM Challis Field Office, and SCNF shows montane forest-steppe transition, montane forest, and shrub steppe/grassland are the dominant vegetation types in the CESA. These wildlife habitats are the most likely to be disturbed by past, present, and reasonably foreseeable disturbance. When the potential disturbance of the MMPO action alternatives is added to the total past, present, and foreseeable future disturbance in the CESA (1.0 percent disturbed), the overall percent of disturbance increases to 1.1 percent in the BLM and NFS land in the CESA.

Incremental habitat modifications in the CESA have had and continue to have detectable effects to all wildlife and special status species that would be measurably affected by the MMPO alternatives. However, no incremental habitat modifications would result in a decline in the viability or reproductive rate of any species population, with the exception of American pika. Incremental effects to wildlife species are discussed below.

5.7.3.1. Wide-ranging species

Wide-ranging species, including big game, gray wolf, fisher, and wolverine, have been and are affected by the incremental decreases in habitat in the CESA. Disturbance generally is limited to the attractiveness of the CESA to these species because most require extensive tracts of undisturbed land. However, the mobility of individuals improves the likelihood that wide-ranging individuals in the CESA are able to modify their behavior and seek out undisturbed habitats when familiar areas become disturbed or unusable. In general, wide-ranging species would be more affected by habitat fragmentation that would limit movements and break up large tracts of habitat. None of the MMPO alternatives would have any measurable effect to the incremental fragmentation effects occurring in the CESA that may be affecting wide-ranging species.

Regarding big game winter range, the decrease of big game winter range habitat when added to the incremental decreases in habitat occurring in the CESA would not be sufficient to cause a cumulative effect to big game species. Based on observations at the TCM, mule deer and elk individuals occupy modified habitat and tolerate a proximity to humans. For mule deer or elk, it is particularly unlikely that an incremental decrease in habitat with the addition of decreases in habitat from the MMPO would adversely affect the growth rate of any mule deer or elk population. Bighorn sheep would not be affected by incremental habitat alterations because habitats removed by the MMPO are only marginally suitable, and these decreases would not add any substantial amount to the incremental decreases that may be occurring in the CESA.

Regarding wide-ranging species that are BLM-sensitive (gray wolf, fisher, wolverine), it is unlikely that more than a few transient individuals occur in the CESA at any one time and any effects to these individuals from incremental habitat alterations would not be sufficient to adversely affect the reproductive rate of any sensitive species' population.

5.7.3.2. Migratory birds

Migratory birds, particularly raptors (including boreal owl, flammulated owl, great gray owl, and northern goshawk), have been and are affected by the incremental decreases in habitat due to habitat removal and alterations in the CESA. Human presence limits the attractiveness of the CESA to migratory raptors and owls as nesting birds are likely to become stressed or abandon a nest if a disturbance persists within too close a range. A cumulative effect would result if nest abandonment or reduced nesting success was frequent enough within a population to result in a diminished reproductive rate. The decreases in habitat and alteration from the MMPO would not cause a cumulative effect to raptor populations (including sensitive species) because the habitats to be disturbed under the MMPO are only marginally suitable due to their proximity to the mine. It is unlikely that raptors would choose such habitats for nesting unless they are accustomed to the nearby activity. Also, pre-construction surveys and mitigation measures for any nests found within specific buffers would ensure that disturbance-related nesting losses are limited to the extent possible.

5.7.3.3. American pika

American pikas have been and are affected by the incremental decrease and alteration of talus habitat in the CESA. The elimination of the waste rock habitat under the MMPO as part of reclamation (including Alternative M1) would remove a habitat area currently being used by pikas. This decrease in habitat would cause a reduction in the reproductive rate and thus viability of the local population and thus would be a cumulative effect to the species.

5.8. Fish and Aquatic Resources

5.8.1. Introduction

The CESA for fish and aquatic resources includes the Thompson Creek, S. Creek, and Bayhorse Creek 5th level watersheds, plus the Salmon River between the Thompson Creek and Bayhorse Creek watersheds (214,506 acres) (Figure 5.6-1). The CESA for special status fish species is the BLM Challis Field Office area and the Challis–Yankee Fork Ranger District of the SCNF (1,792,261 acres) (Figure 5.8-1). The effects to fish and aquatic resources from the MMPO and land disposal alternatives would be limited to these watersheds. However, for special status species all habitats and metapopulations contained in the administrative boundaries listed above were included to incorporate all effects to populations of these species.

Land uses in the CESA that have affected fish and aquatic resources include water diversions, livestock grazing, and timber harvest as these activities increase sedimentation, alter stream flow, alter temperature, and affect water quality. Mining has also caused effects to water quantity. In some cases, mining related activities impede stream flow such as Cherry Creek which no longer discharges to Thompson Creek; the lower reach of Cherry Creek has been filled and the water diverted to the pumping station to be used at the mill. Residential development and agriculture in the CESA are limited as only 7 percent is private land.

Figure 5.8-1. Special status fish species CESA.

5.8.2. Past, Present, and Reasonably Foreseeable Actions

Water diversions for irrigation on the Salmon River and many tributaries have decreased streamflow in the CESAs relative to pre-agricultural conditions. As a result, low streamflow and high temperatures limit many fish populations (including special status species) in the CESAs including populations in Thompson Creek and S. Creek (BLM 1998, IDFG 2005a). The TCM is by far the largest mine in the CESAs; the other mines are small (typically < 10 acres) historic mines, primarily in the Bayhorse drainage, except for the Three Rivers Stone quarry (active, up to 182 acres of surface disturbance). Several of the historic mines are near the TCM. These mines include the Tungsten Jim mine next to Thompson Creek upstream of Buckskin Creek (with encapsulated mill tailings along Thompson Creek between the mouth of Cherry Creek and the mouth of Thompson Creek); the Twin Apex mine in the Bruno Creek drainage, and the Redbird lead-zinc mine next to S. Creek and just upstream of the confluence of Bruno Creek and S. Creek. The effects to water quality from these (and other) historic mines have not been quantified. However, the Tungsten Jim and Twin Apex mines may contribute to contaminants in Thompson Creek and S. Creek, respectively (Section 5.6).

Other mines in the Upper Salmon River watershed include the Clayton silver mine (just north of the Salmon River portion of the CESA, last operated in 1986) and various historic mines in the Bayhorse Mining District including the Riverview, Compressor, and Powderbox mines (BLM 2013). Mining activity in this watershed effects special status fish in the Salmon River. The BLM cooperated with the EPA in the design and planning of a large-scale tailings stabilization project (rock cover to reduce wind-blown dust from the surface of the tailings pile and a diversion ditch to divert water from the pile) at the Clayton mine during 2001 to 2003. In addition, the BLM subsequently completed stream channel restoration, riparian revegetation, and water quality monitoring. A portion of the Bayhorse Mining District is being developed as a State historical park. The BLM is cooperating with the State in the assessment of possible environmental and safety risks and planning safety closures on sites adjacent to the proposed state park (BLM 2013).

Other than the TCM, the Three Rivers Stone quarry, and other more historic mining activity, the primary land use in both CESAs for fish and aquatic resources is grazing (Table 5.1-2). The livestock industry has been an integral part of both CESAs since human settlement of the area. Following years of grazing, livestock stocking levels have recently decreased in order to bring numbers in line with forage production. Livestock grazing would continue to be a major land use activity in the CESAs but is not expected to increase above current rates. The effect of grazing near aquatic habitats typically includes effects to riparian vegetation and streambank stability, which can lead to increased water temperatures and increased levels of sediment in the stream substrate. High water temperatures and sedimentation are both detrimental to fisheries, particularly salmonids such as bull trout, Chinook salmon, steelhead/rainbow trout, and cutthroat trout.

There has been 1,124 acres of timber thinning and harvest (unrelated to mining) in the fish and aquatic resources CESA (Appendix 5A). Removal of trees and vegetation increase the potential for sedimentation into nearby aquatic environments through run-off and decreasing infiltration. Furthermore, logging roads can alter water flow on the soil surface, creating impervious surfaces that concentrate run-off and increase erosion. The primary effect of these activities on aquatic

systems is increased erosion with the secondary effect of increased sediment loading in downstream surface waters. The level of erosion and sedimentation as a result of timber harvest in the CESA has not been quantified; however, the effects described are typical of disturbance associated with timber harvest and have likely occurred in the CESA to some extent at various points in time.

On Lyon Creek, IDFG installed a pipeline to replace an existing open ditch, which resulted in a water savings and more water in Lyon Creek for native fish (Appendix 5A). In addition, the diversion was screened, which reduces fish entrapment and benefits Lyon Creek fish populations.

In general, many activities that are occurring in the CESA are expected to continue in the foreseeable future. This includes water diversions, mining (i.e., TCM, Three Rivers Stone quarry, and Ramshorn quarry), livestock grazing, and timber harvest/vegetation management (e.g., Mosquito Flat Fuels Reduction Project, West Fork Morgan Creek Vegetation Management Project). These activities effect water quantity (water diversions and mining), water quality (mining, grazing, timber harvest), and stream substrate conditions (mining, grazing, and timber harvest) (Section 5.8.2.). Although these activities will continue in the future (Appendix 5A), with the exception of mining, they will essentially continue at or near current levels. As a result, the existing condition of aquatic habitat is also expected to remain similar to current conditions.

However, there are additional projects aimed at improving aquatic habitat conditions in the CESAs for fisheries. The Yankee Fork Rehabilitation Project (Appendix 5A) would restore a dredged mined area on the Yankee Fork of the Salmon River to a more natural condition; although this project is outside the general fish and aquatic resources CESA, beneficial effects would occur within the CESA. This project is within the special status fish species CESA.

5.8.3. Cumulative Effects

None of the MMPO alternatives are expected to result in noticeable surface water discharges of sediment to the surface streams due to protections provided by the existing water management system at the mine. Mine water management would reduce streamflow in Thompson Creek during mine operations, with an increase in S. Creek streamflow. However, these changes would be negligible and would not represent a noticeable change in the current conditions. Following closure, S. Creek streamflow would increase, as would streamflow in the Salmon River. However, these increases would also be mostly negligible and noticeable only under extreme low flow conditions. Other reasonably foreseeable actions would not be expected to appreciably reduce or increase the flow in Thompson Creek or S. Creek and current conditions would essentially remain the same.

The quality of water would decrease in Thompson Creek and S. Creek under the MMPO action alternatives. Under the best estimates for all alternatives, any decreases in water quality would be minor, meeting all WQSs. Only under the upper estimates during the lowest streamflow (7Q10) would WQSs be exceeded. This would include cadmium in S. Creek for the upper estimates during 7Q10 streamflow under all alternatives. For Thompson Creek, this would include copper under upper estimates during 7Q10 streamflow for Alternative M2 and M3. However, the current baseline condition (Section 3.6.) accounts for the other major contributors

of contaminants in these watersheds (i.e., the historic tungsten mine, Twin Apex mine, Redbird mine). As a result, the effects are the cumulative water quality effects. Additional cumulative effects related to water quality are not expected as there are no other reasonably foreseeable activities that would affect water quality in these watersheds.

Due to the migratory nature of fish in the Salmon River system (including both anadromous and fluvial migrants) effects to fish populations in Thompson Creek and S. Creek could have cumulative effects to not just the fish in these streams (resident and migratory), but to the overall fish populations (including TES fish) in the upper Salmon River system. The potential for cumulative effects to upper Salmon River populations depends not only on the level of effects predicted under the various alternatives, but also the degree to which fish in Thompson Creek and S. Creek are migratory, which is unknown for many fish populations (i.e., steelhead/rainbow trout, westslope cutthroat trout, and bull trout) and varies with hatchery efforts in S. Creek.

Under best estimates for both Thompson Creek and S. Creek under all alternatives, effects to fish populations would be negligible and any cumulative effects would also be negligible. Under upper estimates for Alternative M1 and M2, moderate effects to fish populations would occur in S. Creek during low flow (7Q10 streamflow) events. These effects could result in short-term decreases in population sizes of sculpin, steelhead/rainbow trout, cutthroat trout, and Chinook salmon. Similar effects may occur in Thompson Creek under the upper estimates during 7Q10 streamflow for Alternative M2. As discussed above, it is unknown how much fish produced in Thompson Creek and S. Creek contributes to the fish populations in the Salmon River. However, given the other potential effects to fish populations in the CESA due to many of the past, present, and reasonably foreseeable actions (e.g., reduced water quality in other streams, reduced streamflows, higher water temperatures, etc.) the cumulative effects to populations in the upper Salmon River system could be the same as described for these streams.

Water quality effects to the Salmon River under best and upper estimates would have negligible effects to fish populations under any of the MMPO alternatives when considered alone. However, the effects were not modeled to include any additional effects to water quality from downstream sources (e.g., Clayton silver mine, other downstream sources). Cumulative decreases in water quality could have negative effects on fish populations, but the magnitude of such effects are very difficult to determine without quantitative analysis. Any decrease in water quality would add to cumulative effects.

The land disposal alternatives would reduce the amount of critical habitat for Chinook salmon, steelhead trout, and bull trout under Federal management. Although there would be acquisition of portions of Lyon Creek and the Salmon River corridor on the Broken Wing Ranch, these do not contain the same type of habitat when considering the recovery of special status species. The possible spawning/rearing habitats on Thompson Creek and S. Creek have a greater potential for producing fish. This would be an adverse cumulative effect on fisheries. However, since BLM would be granted a conservation easement on Thompson Creek and S. Creek for the continued protection of aquatic habitat (including designated critical habitat) and fisheries, there would be no cumulative effects from the land disposal alternatives.

5.9. Wetlands, Floodplains, and Riparian Areas

5.9.1. Introduction

The CESA includes the Thompson Creek, S. Creek, and Bayhorse Creek 5th level watersheds (213,514 acres) (Figure 5.4-1). The effects to wetlands and riparian area from the MMPO and land disposal alternatives would be limited to these watersheds and cumulative decrease or increase of these effects would be important on a watershed scale. There would be no effects to mapped floodplains from the MMPO or land disposal alternatives.

There are 2,760 acres (1.3 %) of wetlands and riparian areas in the CESA (GAP data). Cumulative effects can include modification in wetland sizes, function, or continuity. Effects to most wetlands and/or riparian areas in the CESA have occurred mainly through mining, road building, and utility development activities (Table 5.1-2). The reasonably foreseeable developments in the CESA are the same as those described in vegetation, forest resources, and invasive and non-native species (Section 5.4).

5.9.2. Past, Present, and Reasonably Foreseeable Actions

The principal past and present effects to wetlands and riparian areas in the CESA likely occurred as a result of the construction of SH 75 along the Salmon River. In addition, the past construction of the US 93 and BLM/Forest Service roads along S., Pat Hughes, No Name, Buckskin, Cherry, Thompson, and Bruno creeks have also disturbed an unspecified area of wetlands. The total area of road disturbance in the CESA is 645.3 acres; the area of this total that could have disturbed wetlands is clearly much less, but there are no specific data allowing this effect to be quantified. As these roads were constructed prior to 1977 (EO 11990), off-site mitigation for these decreases was not required.

Other past and present disturbance to wetlands in the CESA has included an unquantified amount of wetland effects from fill placement and road crossings associated with mining activities at the historic mines in the CESA and wetland disturbance from TCMC mining activities, especially related to the construction of the WRSFs in the Buckskin and Pat Hughes drainages and the construction of the TSF in the Bruno Creek drainage. The area of wetlands affected by current mine facilities is unknown.

Utility construction in the CESA has disturbed another 1,031 acres (Table 5.1-2). Again, the actual portion of this total that could have disturbed wetlands is certainly much less, but no data are available to quantify the effect. Some wetland effects, although not specifically described, likely have or are likely to occur from road maintenance, livestock grazing, and other activities, such as those conducted on private lands in the CESA. These effects cannot be quantified due to lack of data. The documented past and present effects to wetlands in the CESA cannot be accurately quantified; however, based on the presence of disturbance in many common wetland locations (along drainage bottoms) it is assumed that past and present effects to wetlands are abundant.

The conversion of lands to agricultural and residential uses has further affected riparian areas, wetlands, and springs located on private lands. The area within the CESA that is private agricultural land is anticipated to remain as such. The cumulative effects within the CESA has

been a reduction in the diversity of seral plant communities present within these privately developed areas. Some additional wetland effects, although not specifically described, are likely to occur from road maintenance, livestock grazing, and other activities, such as those conducted on private lands (i.e., residential development, agriculture) in the CESA. These effects cannot be quantified due to lack of descriptive data.

5.9.3. Cumulative Effects

In addition to these past and present effects, the MMPO action alternatives could result in disturbance of up to 3.36 acres of wetlands and 9,900 linear feet of stream channel designated as WUS due to the MMPO and reclamation at the end of mine life, which would be mitigated, depending upon which action alternative was selected and ultimately approved. This proposed wetland disturbance would be less than 0.1 percent of the total wetlands in the CESA.

Although additional wetlands in the CESA could be disturbed in the future, compensatory mitigation would be required by the USACE for most new projects that affect wetlands (Appendix 2A). Such mitigation would thus essentially eliminate a potential net decrease in wetlands and any incremental effects.

5.10. Air Quality, Noise, and Climate Change

5.10.1. Introduction

The CESA for air quality is Custer County (3,161,469 acres) (Figure 5.2-2). However, changes in emissions from off-site transportation and processing of molybdenum concentrate and effects of operations on climate change are considered regionally and globally. The CESA for noise is the area within a 4 mile radius of the center of the mining activities and a 300 foot buffer around the S. Creek and Thompson Creek roads from SH 75 to the start of the Bruno Creek Road (mine entrance) and around the Broken Wing Ranch (33,653 acres) (Figure 5.10-1, Figure 5.10-2).

Custer County was selected as the CESA for air pollutants due to the reasonably large area in which air pollutants typically disperse. There would be no meaningful emissions of GHGs for any of the MMPO or land disposal alternatives (Section 4.10.3). The relatively small CESA for noise was established because noise from mining is rapidly attenuated by vegetation and topography to levels that are not discernible to humans. Noise related to access traffic and haul roads is of importance to persons along nearby public roads and in nearby residences.

5.10.1.1. Air Quality

The BLM Challis Field Office area and SCNF generally have excellent air quality, e.g., 24 hour $PM_{2.5}$ concentrations of 3 to 6 $\mu g/m^3$. Cumulative effects to air quality in the CESA from past, present, and foreseeable future activities are largely from airborne dust released by agricultural practices, mining, vehicle travel on unpaved roads, and smoke from wildfires or prescribed burns. Grazing and timber harvesting can produce fugitive dust, but the quantities are minimal and are expected to remain approximately equal to present conditions. Travel on unpaved roads in the CESA can affect air quality from auto emissions and fugitive dust, but this type of use has not affected air quality measurably in the past and is not considered a concern. There are no Class I areas within the CESA; the nearest Class I area is the Sawtooth Wilderness Area.

Mining is the major fugitive dust producing activity in the CESA. The fugitive dust emissions from mining would likely remain stable as the dust emission rate is roughly proportional to the mining rate.

Timber harvest/vegetation management, livestock grazing, recreation, and agriculture have not and would not be expected to contribute meaningfully to fugitive dust or other emissions. Residential development and the associated potential for woodstove burning could be additive, however, since less than 6 percent of the CESA is private land, residential development is limited. Utility development contributes to dust emissions locally and temporarily.

5.10.1.2. Noise

Most of the noise CESA is in undeveloped or rural agricultural areas. Sources of noise around the selected land are mainly from the mine and vehicle traffic on mine and/or Forest Service roads. At the Broken Wing Ranch sources of noise are limited to vehicles on SH 75, occasional agricultural machinery, winds, cattle, and wildlife. Sensitive receptors include a few motorists, recreationists on BLM and NFS land, and wildlife. Sensitive receptors also include a few residents and visitors.

Operation of mining equipment and vehicles would not increase the noise levels in the project area, but would extend them for the period of the MMPO. However, this noise would not be expected to have any effects on sensitive receptors. Only occasional motorists use the county roads, and residents and most recreationists would be sufficiently distant from the work areas that any increase in noise (especially during construction of WRSFs) would have attenuated to very low levels. Any displaced wildlife would be expected to return to the area once reclamation is completed.

5.10.2. Past, Present, and Reasonably Foreseeable Actions

5.10.2.1. Air Quality

The region surrounding the mine is mostly BLM and NFS land, and is sparsely populated. There are no Title V major air pollution sources within 50 miles of the mine, and few permitted minor sources. Air quality conditions in the CESA are generally good. Occasionally air quality in this area is affected from pollutants from upwind sources to the north and west. Activities on Federal lands including wildfires, prescribed fires, and road use produce fugitive dust, nitrogen oxides, VOCs, and CO that would be additive to the estimated emissions from the MMPO action alternatives. Prescribed fires in the BLM Challis Field Office area or SCNF are conducted only when favorable meteorological conditions and air quality conditions exist and when State and Federal ambient air quality standards will not be exceeded.

Figure 5.10-1. Noise CESA, selected land.

Figure 5.10-2. Noise CESA, Broken Wing Ranch.

Mining operations in the CESA include the Ramshorn and Three Rivers Stone quarries, which contribute fugitive dust and machinery emissions. Cumulative effects of dust emissions from the mines operating in Idaho would not be expected because of the relatively local nature of fugitive dust, and the existing regulations for air quality. Air quality on BLM and NFS land is typically good to excellent; therefore, cumulative effects to air quality from existing mining activities would be negligible.

Wildfire and prescribed burns have the greatest potential to affect air quality in the CESA and surrounding lands. Fire produces particulates, carbon monoxide, nitrogen oxides, and volatile organic compounds. Fuel loading in forested and non-forested vegetation in the CESA has increased, along with the risk of wildfires that may contribute to air pollution in the future.

There are no Title V major air pollution sources in the CESA. Other small mining operations are occurring in the CESA, including the Ramshorn quarry and the Three Rivers Stone quarry. These generate dust and exhaust emissions. The MMPO action alternatives would result in small increases of the annual PM_{10} and $PM_{2.5}$ generated from the additional area of the WRSFs and the TSF.

5.10.2.2. Noise

The Redbird area residents closest to the S. Creek Road experience intermittent noise effects due to traffic to and from the mine. These residents are seasonal and do not occupy the area year-round. Other homes, activity areas, or cabins near the access roads north of SH 75 experience intermittent, minor (or occasionally moderate) effects due to traffic to and from the mine site. Other sensitive receptors are distant enough to experience negligible effects from anything other than localized motorized travel.

Existing noise sources such as mine operations, mine-related traffic, other traffic, and miscellaneous recreational vehicles would continue to produce noise at varying levels and varying times.

5.10.3. Cumulative Effects

5.10.3.1. Air Quality

Wildfire emissions, when added to existing concentrations of air pollutants, could produce cumulative effects that result in non-attainment of the particulate standards in specific areas. Prescribed fires are conducted in compliance with State regulations for protection of air quality and only when ambient air quality standards will not be exceeded. Depending on the proximity of fires to the mine, and the prevailing wind direction, emissions from the fires could be additive to those from the mining operations. Smoke disperses rapidly in most cases and effects to air quality are limited to the duration of the fires. It is not possible to quantify these effects in this CESA due to the uncertainty of these conditions, so it is not meaningful to determine the cumulative effects of adding the particulate emissions from the MMPO to potential smoke emissions from fires. The MMPO alternatives would comply with the NAAQSs and applicable State and Federal regulations on protection of air quality.

5.10.3.2. Noise

Mining-related noise in the applicable CESA, under any of the MMPO alternatives, would basically be equivalent to the existing conditions. The noise from these operations would not be cumulative. Noise from haul traffic between the mine pit and facilities would also be the same as present conditions. The public driving on the Thompson Creek and S. Creek roads is currently exposed to the mining and haul traffic noise. Considering past, present, and foreseeable actions combined with disturbance from the MMPO alternatives to these resources, cumulative effects would be short term and negligible. Wildfire could add additional pollutants but these effects cannot be predicted. There would not be any cumulative effects to air quality or noise as a result of the land disposal alternatives.

5.11. Visual (Aesthetic) Resources

5.11.1. Introduction

The CESA is an 11 mile radius around the mine area, the distance from the mine to the furthest KOP (243,284 acres) (Figure 5.11-1). This viewshed contains all relevant actions in the region of the mine, and a large portion of the White Cloud Mountains and the relevant portions of the Salmon River corridor. Using a larger area would not capture any additional relevant effects.

The CESA is in a region of mountain ranges and valleys. The most common landforms in the area are steep mountainsides, which are cut by small creeks and drainages. Although scenic variety exists in the topography and densities, arrangements, and colors of vegetation, no visually distinct landscapes are found in the CESA. The majority of BLM land in the CESA is managed under VRM Class III, with the rest managed under VRM Class II. The general VQO for the portions of the MMPO and action alternative on NFS land is Modification, under which, "management activities may visually dominate the original characteristic landscape" (USDA 1974).

5.11.2. Past, Present, and Reasonably Foreseeable Actions

The CESA is generally not disturbed visually other than for timber harvest, roads, mining operations, range improvements, power lines, and pipelines. The largest type of disturbance is mining and exploration activity related to the TCM. Past and present mining disturbance has visually altered 1.2 percent of the CESA. This number is misleading however, because there are 9 current and 52 past mining operations in the CESA, for which the area has not been quantified in the public records (except for the TCM). Historic operations are in various stages of natural revegetation. Final reclamation of the TCM would reduce much of its visual effect.

Disturbance due to mineral exploration and mining coincide with disturbance attributed to timber harvest in many cases, since timber sales are often conducted as the initial phase in a mining or exploration project. Roads have disturbed 709 acres (0.3 %) of the CESA. Utility construction has disturbed another 758 acres (0.3 %), but has likely been mostly reclaimed, although power lines are visible in areas. Burned areas and agricultural areas are more or less visually acceptable; burned areas if occurring as a natural event are noticeable, but typically are not perceived as human-caused or intrusive development. Agriculture and rural residential development are a common land use in the area and visually is a very small part of the present landscape as 3.5 percent (8,426 acres) of the CESA is private land.

Figure 5.11-1. Visual resources CESA.

The Phase 7 mine disturbance for the mine would be 2,822.9 acres. The surface area of the pit and the TSF have added to the permanent landscape change and the TSF can be seen from points above S. Creek Road. The Pat Hughes WRSF can be seen from one point on Thompson Creek Road. Views of the current mining activity in the CESA are blocked from most areas and along SH 75 by the steep and varied topography, although visitors to the higher elevation trails of the Custer Fire Lookout and Railroad Ridge have distant views of the mining activity and views where past mining disturbance may be noticeable. Continued mining in the CESA would include operations at the Three Rivers Stone quarry (up to 182 acres of surface disturbance). Further, there would be up to 60 acres of disturbance associated with the Bruno Creek exploration activities. There could be additional activities on private lands, but this represents a very small portion of the CESA.

5.11.3. Cumulative Effects

Alternative M2 could potentially add up to 446.7 acres (0.2 %) of disturbance to the CESA, with all of that disturbance reclaimed except for the open pit. Portions of the disturbance (mine or impoundment) would be visible from locations such as the Custer Fire Lookout, South Butte along S. Creek Road, Railroad Ridge, and Thompson Creek Road south of the Pat Hughes WRSF. The general mine area is not visible to travelers on SH 75.

The continual expansion of the WRSFs and the TSF would occur visually as a gradual change. There is a low level of sensitivity to this expansion due to lack of public access to most views of the mine site. Views from a distance are possible by recreationists or hunters on Railroad Ridge, Custer Fire Lookout, or South Butte above S. Creek Road. Past, present, and reasonably foreseeable actions would be less than 2.0 percent of the total CESA for visual resources.

Reclamation of mined areas in the CESA would reduce the visual contrast of bare earth in the disturbed areas with adjacent forest vegetation. The reclaimed area's landscape would be revegetated primarily with grass and forbs and patches of shrubs and trees. The reclaimed areas would still be visible but would not be as obvious a visual effect as the mining activities. The VQOs described in the Challis National Forest LRMP would be adjusted for these areas. As activity shifts from currently active mining areas to other areas, and the disturbance is sequentially reclaimed, the landform and color contrast as well as the obvious presence of mining would be lessened for those traveling the secondary roads, or recreating in the area. Over time, the landscape views inclusive of reclaimed mining areas would become a more acceptable part of the landscape. The eventual establishment of ‘islands of diversity’ (clusters of planted trees and shrubs) would restore a setting more similar to the original landscape in perhaps 10 to 50 years.

5.12. Land Use and Recreation

5.12.1. Introduction

The CESA is Custer County (3,161,469 acres) (Figure 5.12-1.), which contains the mine and nearly all of the selected and offered lands (only 80 acres in Bannock County). Accordingly, the most meaningful cumulative effects related to land use and recreation would occur by far in Custer County. The majority of lands in Custer County are Federally-owned. Changes in land jurisdiction and land management (e.g., wilderness designations) not only indicate changes in

land use, but also indicate changes to socioeconomic factors (Section 5.13.). The meaningful cumulative effects of changes to special designations and recreational opportunities would be limited to these areas which are known and frequented by many people.

Public recreation is generally available on the public lands in the CESA, which amount to about 92.5 percent of all the land in the CESA. The Federal land administered by the BLM Challis Field Office comprises 25.4 percent of the CESA. The majority of Federal land in the CESA (67.1 %) is administered by the SCNF.

Special designation areas in the CESA include the Challis ERMA, Upper Salmon River SRMA, the Challis Wild Horse and Burro Herd Management Area, and the S. Creek IRA #06-005. Three of central Idaho's high country landmarks are at least partially in the CESA: a portion of the Frank Church River of No Return Wilderness to the north, the Sawtooth National Recreation Area to the west, and the Boulder-Whiteclouds Mountains complex to the south. There are numerous primitive campgrounds and a variety of other developed campgrounds and recreational facilities (such as the Land of the Yankee Fork State Park) in the CESA.

Enjoyment of the recreation opportunities in the CESA depends upon a reasonable degree of public access, either motorized or non-motorized. Once a visitor is on Federal lands, the enjoyment of the recreation depends, in part, on the relative level of introduced disturbance from other land uses, particularly in the semi-primitive areas. A dominant recreational use on public lands in the CESA is big game hunting.

5.12.2. Past, Present, and Reasonably Foreseeable Actions

Near the project area, most recreation is concentrated along the Salmon River/SH 75 (Salmon River Scenic Byway) and East Fork Salmon River. The Yankee Fork State Park (520 acres) is west of the project area at the junction of US Highway 93 and SH 75. Numerous recreation facilities have been developed in the CESA including campsites, trails, a shooting range, walking/bike paths, fishing areas, boat ramps, and picnic areas. In addition, there are numerous recreation outfitters and guiding companies permitted to provide river rafting, fishing, hunting, trail rides, auto touring, backpacking, and hiking tours on public lands in the CESA.

Private land in the Bayhorse mining district was recently acquired by the Idaho Department of Parks and Recreation (IDPR) which is developing the land as a new state park. The Bayhorse Townsite, Beardsley, and Pacific mine sites have been reclaimed, remediated, and redeveloped and are open for use to the public. The Ramshorn and Skylark mine sites began cleanup during the 2012 field season. The IDPR has or is in the process of preserving and restoring historic features in the Bayhorse Mining District property, which includes 500 acres, to provide recreational and educational opportunities to the citizens of Idaho and other users. The general area along SH 75 already attracts tourism by offering the public the opportunity to visit the historic mining operations along the Yankee Fork of the Salmon River – Bonanza and Sunshine mines (Yankee Fork State Park). By developing Bayhorse as a state park, this will provide an additional destination for this area's tourism base, providing economic benefits to the town of Challis and Custer County.

Figure 5.12-1. Land use and recreation CESA.
TCMC-BLM selected and Broken Wing Ranch; TCMC-Forest Service selected land and offered land

Past and present disturbance that has affected land use and recreation in the CESA is from previous mining and exploration operations, timber harvest/vegetation management, roads, agriculture, and limited residential/community development. Mining at the existing TCM affects recreation since active mining areas are off limits to public motorized access and recreation for the duration of mining and reclamation activities. Non-motorized access and recreation is allowed across mining areas except for active mine operation areas that might present a safety hazard to visitors. Visitors to the public lands adjacent to the active mining areas would likely notice the sight and/or sound of mining activities, which could detract from the recreational experience for some users.

Another type of land use and recreation effect is changes in land jurisdiction. The Redbird Mine Land Sale consisted of a FLPMA sale of 298 acres of public land to private ownership (BLM 2008). The Birch Creek land exchange between the BLM and the Nature Conservancy resulted in BLM acquisition of 350 acres in exchange for 270 acres, a net increase of 80 acres. Federal lands that are transferred to private ownership are typically no longer available for public uses such as recreation and grazing.

In the CESA, two specific recreation developments are currently planned. The Basin Creek Dispersed Campsite project would develop five to seven rustic campsites along Basin Creek to replace camping capacity lost from the decommissioning of the Basin Creek Campground. Ongoing development of the Bayhorse Mining District State Park will provide additional recreation and educational opportunities.

The Forest Service-TCMC land exchange would exchange ~2,850 acres of Federal land for 523 acres of private lands, for a net decrease of about 2,330 acres. This transfer would affect public access, grazing, and other uses of that land. The Bruno Creek exploration project would temporarily disturb up to 60 acres and permanently disturb approximately 3 acres; however, this area is adjacent to the TCM and is not likely used for recreation.

5.12.3. Cumulative Effects

Past, present, and future land use appears to be in accordance with BLM land use plans, Forest Service land use plans, county zones, or land use designations. Past, present, and future development of mining operations, along with residential development and Federal land sales or exchanges could result in a trend shifting land ownership from public to private, and land use away from past uses such as grazing to industrial. In addition, land sales would reduce public lands available for recreation and other public use. Recreation facilities in the CESA are also being affected by increasing recreation pressure (including overuse and abuse of resources and facilities during heavy use seasons), combined with age of development and an inability to adequately maintain sites.

Past, present, and reasonably foreseeable projects and disturbance in conjunction with the MMPO and land disposal action alternatives would contribute cumulative effects to land jurisdiction, land use, public access, and recreation but would not contribute cumulative effects to special designations.

5.13. Socioeconomic Factors

5.13.1. Introduction

The CESA for socioeconomic factors is Custer and Lemhi counties (6,087,165 acres) (Figure 5.13-1). The individuals and businesses that would be affected by the project would be primarily in these counties, with the cumulative effects greater for the individuals and businesses in Custer County where the TCM is located.

5.13.2. Past, Present, and Reasonably Foreseeable Actions

Active mining operations in the CESA include the TCM, Ramshorn quarry, Three Rivers Stone quarry, and the Idaho Cobalt mine. The Idaho Cobalt mine is 45 miles west of the town of Salmon in Lemhi County and consists of the ongoing development of an underground cobalt-copper-gold mine, processing plant (mill), and ancillary facilities.

Federal lands in the CESA have historically been used for livestock grazing. The BLM and Forest Service receive revenue for these grazing rights. Land sales and exchanges, such as the Redbird mine proposed sale and the Birch Creek land exchange, reduce lands available for public livestock grazing and eliminate the associated revenue. However, the lands become part of the tax base which generates revenue for the county.

Wildfires would have the short-term effect of reducing forage for livestock and the long-term effect of reducing the amount of timber available for harvest. Either of these would have a negligible effect on socioeconomics as very few businesses or people would be affected.

Continued molybdenum mining would result in future private and public income at levels approximately the same as past and present conditions. Other incoming industry or developments, if proposed in the CESA, would be more likely to affect socioeconomics; Alternatives M2 and M3 are a continuation of the current industry until 2025. No major changes to population, housing, employment, or private and public income would occur as a result of the proposed project. The Forest Service-TCMC land exchange would affect grazing, recreation, and other public uses of both the offered and selected lands.

5.13.3. Cumulative Effects

Because the MMPO action alternatives are a continuation of existing mining at the TCM, implementation of Alternatives M2 or M3 would not contribute effects on public services beyond existing levels. This would add to the continued economic stability in the CESA that results from multiple industries and several viable facilities in an industry.

Figure 5.13-1. Socioeconomic factors and cultural resources CESA.
Selected land and Broken Wing Ranch.

The unemployment rate in Custer County as of November 2013 was 6.6 percent, higher than the rate for the State of Idaho but lower than the national rate. The unemployment rate for Lemhi County for December 2013 was 9.3 percent, higher than either the State or national rate (Idaho Department of Labor 2014). The decrease in TCMC employees after mining would contribute to the unemployment rate in the CESA, putting a greater burden on Federal, State, and county public services (i.e., unemployment wages, Medicare/Medicaid, etc). There would be a local decrease in private and public income and a wider decrease in secondary income to vendors and suppliers of the closed facilities. If the MMPO area was not utilized for molybdenum mining, it would continue to be available for other activities such as logging, grazing, and recreation that would result in socioeconomic benefits in the CESA.

Under the land disposal action alternatives, there would be a cumulative net decrease of acres of Federal lands associated with the land exchanges/transfers (Redbird Mine Land Sale, Forest Service/TCMC, Birch Creek Land Exchange, and Alternatives L2 through L4).

The cumulative effects of the MMPO action alternatives in conjunction with other upcoming projects would not strain public resources in the area such as schools, medical facilities, and housing as there would be no major changes to population, housing, employment, or private and public income. Given the few remaining AUMs in the Thompson Creek Allotment and the resource concerns along the Thompson Creek riparian area where most grazing in the allotment has typically occurred, the BLM would probably amend the Challis RMP to make the allotment unavailable for livestock grazing.

The overall net decrease in acres of Federal land through land exchanges and sales would reduce the amount of lands available for grazing, recreation, and other public uses. The Federal agencies would lose the revenue associated with grazing, mining, timber sales, etc., but would have reduced administration costs with less Federal land. There would not be any cumulative effects to the general socioeconomic character of the CESA.

5.14. Tribal Treaty Rights and Interests

5.14.1. Introduction

The CESA for tribal treaty rights and interests is Custer, Lemhi, and Bannock counties (6,824,256 acres), which includes the BLM Challis Field Office area, SCNF, and Pocatello Field Office area. The Shoshone-Bannock Tribes and the Nez Perce Tribe have the right to hunt, fish, and gather natural resources on all unoccupied Federal lands in the CESA (Figure 5.13-1., Figure 5.14-1). The CESA was established because these three counties contain all of the lands for which there would be changes in jurisdiction or in unoccupied/occupied status related to the project.

There are no tribal lands in Custer or Lemhi counties. Part (115,533 acres, 21.4 %) of the Shoshone-Bannock Tribes' Fort Hall Indian Reservation is in Bannock County. The CESA contains 5,763,003 acres (84.4 %) of Federal lands. Tribal members exercise treaty rights on unoccupied Federal lands, such as in the vicinity of the mine, including the Salmon River and East Fork Salmon River, by hunting, fishing, and gathering and conducting other traditional uses of the resources. The Tribes consider the entire area surrounding the Salmon River corridor to

have cultural significance, both historically and presently. The ability of Native Americans to exercise treaty rights and practice their traditional culture in the CESA depends on access to Federal lands which has been reduced through decrease of "unoccupied lands" and degradation of the resources over time.

5.14.2. Past, Present, and Reasonably Foreseeable Actions

Past and present effects to resources include dams along the Snake River that have affected salmon runs and limited the availability of salmon for consumption. Development of open space, access restrictions, and land disposals reduced unoccupied lands for practicing tribal treaty rights. Wildfire suppression, grazing, mining, and timber harvest have changed the vegetation and affected water quality. Mining limits public access in and around the mine location, affects the visual appearance of the landscape, reduces acres available for gathering, and potentially reduces the availability of big game for harvest in the area.

According to information provided by the Shoshone-Bannock Tribes (BLM 2008b), the past creation of the East Fork campground removed an important cultural site for the Tribes and the excavation of Pit 1 at the Three Rivers Stone quarry altered a key geographical landmark marking the confluence of the East Fork Salmon River and Salmon River.

Current mining operations in the CESA include the Idaho Cobalt mine, TCM, the Ramshorn quarry, and Three Rivers Stone quarry; these lands are considered occupied Federal lands that are currently not available for exercising treaty rights. Past and present mining in the CESA has and continues to affect treaty rights by modifying the tribal viewshed, limiting access, and reducing the areas available for fishing, hunting, gathering, and conducting other traditional activities. These effects would be expected to continue with future mining in the CESA.

Timber harvest/vegetation management projects, such as BLM's Landscape Fire Restoration project, the Bonanza Forest Products project, Garden Creek Fuels Reduction project, the Muley Creek Aspen Restoration Project, the Yankee Fork Restoration project, and others (Appendix 5A), enhance and protect natural resources available on unoccupied Federal lands.

The Redbird Mine Land Sale consisted of a FLPMA sale of 298 acres of public land to private ownership (BLM 2008), a decrease of Federal lands and less area to practice treaty rights. However, the Birch Creek Land Exchange slightly increased Federal lands when the BLM acquired 350 acres in exchange for 270 acres.

The TCMC-Forest Service land exchange would reduce the amount of Federal lands by 2,326 acres, some of which is currently unoccupied. The effects of this land exchange would be very similar to those described for Alternatives L2-L4 (Section 4.14.2). The Upper Yankee Fork Fuels Reduction Project, the Mosquito Flat Fuels Reduction Project, the Morgan Creek Allotment Fence project, the on-going Forest-wide Salmon-Challis noxious weed management program, and similar projects would work toward restoring resources and ecosystems to better and more natural conditions by reducing potential effects of fire to wildlife and plant habitat and livestock grazing to streams.

Figure 5.14-1. Tribal treaty rights and interests and cultural resources CESA, Garden Creek property.

The decrease of unoccupied Federal lands continues. Land jurisdiction in Custer County in 2000 included 2,937,675 acres of Federal lands (813,965 acres BLM and 2,123,710 acres National Forest System); this represented 93.2 percent of the land in the county (IDC 2012). In 2011, 2,935,509 acres of land in Custer County were under Federal administration (USDOI 2012) which is 2,166 acres less than in 2000. Another indicator of this is the SCNF legal acres decreased from 4,237,004 acres in 2002 to 4,235,940 acres in 2012 (USFS 2014), a difference of 1,064 acres. Although these statistics both represent less than a 1 percent change, it indicates a small but steady decline in Federal lands due to land exchanges and land sales. The trend in the future would be similar to slightly less due to the US policy of land retention pursuant to the FLPMA.

5.14.3. Cumulative Effects

In recent years, the effects to natural resources on unoccupied Federal lands are slowly being reversed. Elk, moose, and deer numbers have increased. Federal and State agencies are enhancing native fish and wildlife habitat. In the shift towards ecosystem management, Federal land managers have reintroduced more natural processes such as fire across the landscape. These efforts to improve the condition of natural resources collectively serve to protect and begin restoration of tribal treaty resources and interests.

The land exchange between BLM and TCMC combined with the TCMC-Forest Service exchange would reduce the amount of Federal lands by approximately 8,000 acres. In exchange, the agencies would acquire private lands totaling approximately 1,400 acres, or a net decrease of 6,600 acres (< 0.1 % of the CESA) of Federal lands, consistent with the trend of past land jurisdiction changes.

Overall there would be a cumulative decrease in unoccupied Federal lands available for the Shoshone-Bannock and Nez Perce tribes to exercise treaty rights. Resources used by the tribes would continue to decline in quantity and diversity as unoccupied Federal lands are occupied and/or otherwise disposed and therefore no longer available for exercising tribal treaty rights and interests.

5.15. Cultural Resources

5.15.1. Introduction

The CESA for cultural resources is Custer and Lemhi counties (6,087,165 acres) (Figure 5.13-1). Custer and Lemhi counties represent a reasonably broad cultural domain, and include the portions of the project with cultural resources that would be most affected by the proposed Federal actions. The MMPO or land disposal alternatives would not affect cultural resources outside of this area. Activities associated with the project that might affect cultural resources could occur outside of the actual disturbance of the project, but not likely outside of the CESA.

Cultural resources potentially vulnerable to cumulative effects include prehistoric sites, prehistoric landscapes, historic sites, historic structures, and traditional cultural properties. The incremental degradation or elimination of the resources reduces the information and interpretive potential of historic properties. Degradation of the integrity of a site, or characteristics that

qualify the site for the NRHP, can be diminished to an extent it is no longer eligible for listing on the NRHP.

5.15.2. Past, Present, and Reasonably Foreseeable Actions

Past and present actions in the CESA that have potentially affected cultural resources include wildfire, vandalism/looting, road construction and maintenance, above and below ground utility facilities, mining, livestock grazing and agriculture, residential and community development, and other developments. Known sites that have been determined ineligible for the National Register do not require avoidance and therefore have likely been affected by activities requiring a cultural resource inventory (i.e., mining development, utility installation, fence projects, etc.). As directed by Section 106 of the NHPA, National Register eligible sites are generally avoided or mitigated if avoidance is not possible for projects with a Federal or State nexus. The effects to cultural sites from projects prior to 1966 (i.e., prior to the NHPA) and/or those without a Federal or State nexus are generally unknown.

Some projects or developments benefit cultural resources. The Land of Yankee Fork State Park has preserved and provides interpretation of many historic features including the Yankee Fork Gold Dredge, the Custer Motorway, and the ghost towns of Bonanza, Custer, and Bayhorse. The prehistoric site known as the Challis Bison Jump is also interpreted and maintained. The Bayhorse Mining District is currently undergoing preservation and restoration of historic features as IDPR creates a State park focusing on historic mining operations. The Bayhorse Townsite, Beardsley mine, and Pacific mine sites have been remediated and restored and provide educational and recreation opportunities open for use to the public.

The reasonably foreseeable actions in the CESA include the TCMC-Forest Service land exchange, road and utility development and maintenance, continued mineral operations, livestock grazing, timber harvest/vegetation management, recreation facility development, and recreational activities. No Forest Service timber sales are proposed for the cultural resources CESA in the current planning cycle. Changes to private agricultural lands in the CESA are likely as some of these lands are converted in the future from traditional agricultural utilization (ranching) to more residential and recreational utilization.

Recreational use is expected to increase and additional facilities are likely including the Basin Creek dispersed campsites and continued development of the Bayhorse Mining District State Park. An increase in the dispersed recreational use of the area increases the potential for vandalism and/or artifact collection at cultural sites.

5.15.3. Cumulative Effects

Past, present, and reasonably foreseeable actions that would affect cultural resources in the CESA have been and would be the result of mining activities, timber harvesting, road development, archaeological excavation, livestock grazing, private development, and likely vandalism and artifact collection. Private development and vandalism/artifact collection are not quantifiable.

Past and present disturbance has affected cultural resources in the CESA. However, in the case of sites that are ineligible for the NRHP, avoidance is not required. For projects under Federal

oversight, NRHP-eligible sites in areas proposed to be disturbed were subject to data recovery under a treatment plan; therefore the effects to the resource were mitigated.

Numerous prehistoric and historic sites have been identified in the CESA and past management and development activities have likely had adverse affects on potentially substantial sites. However, none of the MMPO or land disposal alternatives would result in adverse effects to cultural resources eligible for the NRHP and therefore would not result in cumulative effects to cultural resources.

5.16. Transportation, Access, and Public Safety

5.16.1. Introduction

The CESA is the area within a 15 mile radius of the center of the TCM (452,389 acres) (Figure 5.7-1). The CESA was established to include the major travel routes for TCM-related traffic, the portion of the Salmon River Scenic Byway on SH 75 nearest the project area, and the area in the vicinity of the mine typically used by recreationists.

The CESA (Figure 5.7-1.) contains established transportation routes, including State highways, county roads, local roads, and designated forest roads. Cumulative effects to transportation and access can result from additional traffic due to multiple projects which can increase travel times and congestion, or from increases or decreases in access.

Within the CESA there are over 230 miles of improved roads (Table 5.1-2). Unimproved and 4WD routes were not quantified.

5.16.2. Past, Present, and Reasonably Foreseeable Actions

The CESA contains numerous miles of existing transportation routes that include paved, gravel, and dirt roads that provide access to the TCM, private lands, and the BLM Challis Field Office area and SCNF. The main thoroughfare through the CESA is SH 75, the segment that connects Challis to Sunbeam; it is currently a two-lane paved highway. The Custer Motorway, a one-lane gravel and unimproved dirt road, accessible seasonally, traverses through the northern portion of the CESA. Originally a toll road from Challis to Bonanza, the road was completed in 1879 and remained the only wagon and stage access to the area for years. Because of its popularity as an access to the Yankee Fork area, the old road was reconstructed by the Civilian Conservation Corps in 1933, and designated as "The Custer Motorway." This road is used mostly for recreational purposes, as it is a scenic route that passes through the land of the Yankee Fork State Park.

The transportation network in the TCM locality (e.g., S. Creek Road, Bruno Creek Road, and Thompson Creek Road) was previously described (Section 3.16). There are also other BLM and Forest Service roads and trails. The routes in the CESA situated on NFS land are managed under the SCNF Travel Planning and OHV Route Designation plan (USFS 2009b). This plan designated open, motorized vehicle routes and areas for public use on the SCNF to comply with the Travel Management and OHV Rule to produce a motor vehicle use map. Roads on lands administered by the BLM are managed under the Travel Management Plan for the BLM Challis Field Office (BLM 2008c).

Regular maintenance, improvements, and upgrades are expected to continue along SH 75. Any future, temporary roads built in association with other projects in the BLM Challis Field Office area or in the SCNF, such as timber harvests, utility development, mining exploration, or mining, would be required to be reclaimed, therefore there would be no net disturbance to the transportation system in the CESA in the foreseeable future. Although no new public roads are anticipated, use of the transportation system in the area is expected to increase since recreation use in the area is expected to increase.

As private lands represent only 5 percent of the CESA and 6 percent of Custer County, residential development is not expected to meaningfully increase traffic in the foreseeable future.

5.16.3. Cumulative Effects

Reasonably foreseeable road maintenance and improvements along SH 75 would not create any new disturbance. Roads associated with active mining operations generally would not be available for public use and would mostly be reclaimed after mining operations cease.

Traffic on SH 75 has increased and is expected to continue to increase in the future during the snow-free seasons due to the increase in recreation in the area. The current level of mine-related traffic would continue. The MMPO action alternatives would not cumulatively add to an increase in annual traffic along with increasing recreation traffic. Although new roads would be constructed to assist in mining activities, these would be temporary, would not be available for recreational use, and would be reclaimed when no longer needed; therefore, they would not add cumulatively to the effect of increased unimproved roads in the area.

5.17. Hazardous Materials and Solid Waste

5.17.1. Introduction

The CESA includes all landfills off the mine site that could be affected by the MMPO alternatives. The land disposal alternatives are not evaluated for cumulative effects to hazardous materials and solid wastes because the selected and offered lands do not/would not contain hazardous materials or solid wastes. Hazardous and solid waste generated by the mine would be transported by contractors to permitted landfill facilities, except for certain solid waste buried in landfills at the mine.

Under the MMPO action alternatives, the use, storage, and disposal of hazardous materials or solid wastes would not change. The cumulative effects of the expanded WRSFs and the TSF are included in the following discussion of mine disturbance in the CESA.

5.17.2. Past, Present, and Reasonably Foreseeable Actions

There are four solid waste transfer stations in Custer County: Challis, East Fork, Mackay, and Stanley (Custer County 2012). Non-hazardous solid waste is buried on-site as the mine has its own solid waste disposal permit from the county.

Many of the past, present, and reasonably foreseeable mining operations create the potential for chemical and petroleum spills and possible contamination of Upper Salmon River Subbasin

rivers and tributaries. However, BMPs and a SPCC Plan would typically be employed for most of the projects and mining operations, substantially reducing the risk and the potential for cumulative effects relating to chemicals and petroleum products. The largest potential for fuel or chemical spills would be from vehicles and chemical or fuel transport trucks traveling on SH 75.

Given the existing capacity and regulatory framework for generators, transporters, and transport, storage and disposal facilities, the past, present, and reasonably foreseeable actions would have negligible effects on solid and hazardous waste generation and management. With the BMPs and SPCC Plan in place there should be no impacts from generated or landfilled solid or hazardous waste on utility corridors, livestock grazing, agriculture, or timber harvest. It is highly unlikely that these wastes would start or contribute to wildfires, or that they would impede recreation or residential development unless, for example, someone wanted to recreate or build residential dwellings on an existing landfill; given the large amount of alternative sites for these activities reduces the risks to none. All construction projects would be required to comply with all State, Federal, and local regulations relevant to the handling and disposal of all wastes.

5.17.3. Cumulative Effects

All hazardous wastes generated during the mining operations would be transported to licensed facilities off-site for treatment and disposal. Solid non-hazardous waste would be disposed of in the mine's on-site permitted landfill. Existing and reasonably foreseeable solid and hazardous waste generation locally and regionally would be well within existing capacities and infrastructure of existing facilities. There would be no incremental change in the cumulative effects of these waste management activities from the proposed MMPO in the CESA.

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